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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD

CHICAGO, IL 60604-3590

OCT 17 2008

REPLY TO THE ATTENTION OF:

Lindsay Light II Site/OU 06

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Fairbanks Development Associates, LLC
c/o Michael K. Ohm, Esq.
Bryan Cave LLP
161 North Clark Street
Suite 4300
Chicago, IL 60601

Re: Lindsay Light II Site, Chicago, Illinois
OU 06, 245 E. Ohio

Dear Mr. Ohm:

Enclosed please find an executed copy of the Administrative Settlement Agreement and Order on Consent issued for this Site pursuant to Sections 106 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§9606 and 9622. Thank you for your cooperation in this matter.

If you have any questions regarding this Order, please contact Mary Fulghum, Associate Regional Counsel, at (312) 886-4683 or Verneta Simon, On-Scene Coordinator, at (312) 886-3601.

Sincerely yours,

Richard C. Karl, Director
Superfund Division

Enclosures

cc: Gary King, Superfund Program Manager
Acting Bureau Chief, Illinois Environmental Protection Agency
Bureau of Land, 1021 North Grand Avenue East, Springfield, Illinois 62702

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:

Lindsay Light II 05YT
Operable Unit 6
245 East Ohio
Chicago, Illinois

Respondent:

Fairbanks Development Associates, LLC

ADMINISTRATIVE SETTLEMENT
AGREEMENT AND ORDER ON
CONSENT FOR REMOVAL ACTION

Docket No. **V-W- '08 -C-916**

Proceeding Under Sections 104, 106(a), 107
and 122 of the Comprehensive
Environmental Response, Compensation,
and Liability Act, as amended,
42 U.S.C. §§ 9604, 9606(a), 9607 and 9622

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I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent ("Settlement Agreement") is entered into voluntarily by the United States Environmental Protection Agency ("U.S. EPA") and Respondent. This Settlement Agreement provides for the performance of removal actions by Respondent and the reimbursement of certain response costs incurred by the United States at or in connection with the property designated Lindsay Light 05YT Operable Unit ("OU") 6, located at 245 East Ohio Street, Chicago, Illinois, which is bounded by an existing building on the west, Grand Avenue on the south, East Ohio Street on the north, and North Fairbanks Court on the east and for the purposes of the Settlement Agreement is referred to as the "Site."

2. This Settlement Agreement is issued under the authority vested in the President of the United States by Sections 104, 106(a), 107, and 122 of the Comprehensive Environmental Response Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622, as amended ("CERCLA"). This authority has been delegated to the Administrator of the U.S. EPA by Executive Order No. 12580, January 23, 1987, 52 Federal Register 2923, and further delegated to the Regional Administrators by U.S. EPA Delegation Nos. 14-14-A, 14-14-C and 14-14-D and to the Director, Superfund Division, Region 5 by Regional Delegation Nos. 14-14-A, 14-14-C and 14-14-D.

3. U.S. EPA has notified the State of Illinois ("State") of this action pursuant to Section 106(a) of CERCLA, 42 U.S.C. §9606(a).

4. U.S. EPA and Respondent recognize that this Settlement Agreement has been negotiated in good faith and that the actions undertaken by Respondent in accordance with this Settlement Agreement do not constitute an admission of any liability. Respondent does not admit, and retains the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement Agreement, the validity of the findings of facts, conclusions of law, and determinations in Sections IV and V of this Settlement Agreement. Respondent agrees to comply with and be bound by the terms of this Settlement Agreement and further agrees not to contest the basis or validity of this Settlement Agreement or its terms.

II. PARTIES BOUND

5. This Settlement Agreement applies to and is binding upon U.S. EPA and upon Respondent and its successors and assigns. Any change in ownership or corporate status of the Respondent including, but not limited to, any transfer of assets or real or personal property shall not alter the Respondent's responsibilities under this Settlement Agreement.

6. Respondent is jointly and severally liable for carrying out all activities required by this Settlement Agreement.

7. Respondent shall ensure that its contractors, subcontractors, and representatives comply with this Settlement Agreement. Respondent shall be responsible for any noncompliance with this Settlement Agreement.

III. DEFINITIONS

8. Unless otherwise expressly provided herein, terms used in this Settlement Agreement which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement Agreement or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

a. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601, *et seq.*

b. "D'Ancona Trust" shall mean Alfred E. D'Ancona and Lawrence R. Levin, Trustees of the Alfred E. D'Ancona III Trust, Under the Will of Henry R. Levy and Alfred E. D'Ancona III and Terri R. D'Ancona, Trustees of the H. Richard D'Ancona Children's Trust, Dated June 3, 1994.

c. "Effective Date" shall be the effective date of this Settlement Agreement as provided in Section XXX.

d. "Future Response Costs" shall mean all costs, including direct and indirect costs, that the United States incurs in reviewing or developing plans, reports and other items pursuant to this Settlement Agreement, verifying the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement on or after the Effective Date. Future Response Costs shall also include all costs, including direct and indirect costs, incurred prior to the Effective Date, but paid after that date and all costs, including direct and indirect costs, paid by the United States in connection with the Site between December 31, 2007 and the Effective Date.

e. "Interest" shall mean interest at the rate specified for interest on investments of the U.S. EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

f. "National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

g. "Parties" shall mean U.S. EPA and Respondent.

h. "Past Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States paid at or in connection with the Site from July 1, 2006 through December 31, 2007.

i. "RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901, *et seq.* (also known as the Resource Conservation and Recovery Act).

j. "Response Costs" shall mean all costs, including, but not limited to, direct and indirect costs, that the United States has paid or will pay at or in connection with the Site, including such costs expended in reviewing or developing plans, reports and other items pursuant to this Settlement Agreement, verifying the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement in connection with the Site.

k. "Respondent" shall mean Fairbanks Development Associates, LLC, a Delaware limited liability corporation and its successors and assigns.

l. "Settlement Agreement" shall mean this Administrative Settlement Agreement and Order on Consent and all appendices attached hereto (listed in Section XXX Severability/Integration/Appendices). In the event of conflict between this Settlement Agreement and any appendix, this Settlement Agreement shall control.

m. "Site" shall mean the Lindsay Light II, Operable Unit 6 located at 245 East Ohio Street, Chicago, Cook County, Illinois and depicted generally on the map attached as Appendix A.

n. "State" shall mean the State of Illinois.

o. "Uninvestigated or Unremediated Area" shall mean any portion of the Site which is not radiologically surveyed in accordance with the Work Plan or any portion of the site where any known contamination will remain after completion of the Work.

p. "U.S. EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

q. "Waste Material" shall mean 1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); 2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); 3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and 4) any "hazardous material" under Section 3.125 of the Illinois Environmental Protection Act, 415 ILCS 5/3.125 (2002).

r. "Work" shall mean all activities the Respondent is required to perform under this Settlement Agreement.

s. "Work Plan" shall mean the U.S. EPA-approved work plan including schedule described in Section VIII Work to be Performed and which is attached at Appendix B.

IV. FINDINGS OF FACT

9. Based on available information, including the Administrative Record in this matter, U.S. EPA hereby finds that:

a. Beginning in 1904, the Lindsay Light Company ("Lindsay Light") manufactured gas lights and gas mantles containing radioactive thorium at several locations in the Streeterville neighborhood of Chicago, Illinois. The production of thorium resulted in "mill tailings," a sandy waste containing radioactive thorium that was used as fill material in the Streeterville area. U.S. EPA has not identified any records of Lindsay Light's thorium mill tailing disposal practices in Chicago. In the City of Chicago, where the soil generally is covered by pavement, sidewalks, buildings, and fill material, it is difficult for radiation detection instruments to confirm the presence or absence of buried thorium contamination until soils are exposed.

b. Lindsay Light corporate records indicate that by September 1936, Lindsay Light completed moving its ore processing and manufacturing operations to the City of West Chicago and discontinued its Streeterville operations. After moving to West Chicago, Lindsay Light and its successors continued to produce thorium as well as other radioactive materials. In West Chicago and nearby areas, the radioactive thorium mill tailings were used as fill material, dispersed by wind, and subject to runoff. U.S. EPA determined that the thorium presented a threat to human health and designated four West Chicago areas as separate sites on the National Priorities List of Superfund Sites. Over 670 residential area properties, a 100-acre park, a sewage treatment plant, and nearly 8 miles of creek and river have been or are being addressed by U.S. EPA-ordered removal actions at the West Chicago facility.

c. In 1994, after buried thorium was discovered at 316 E. Illinois, Chicago, Illinois, a former location of Lindsay Light's ore processing plant, U.S. EPA designated 316 E. Illinois as the "Lindsay Light II" removal site.

d. On June 6, 1996, U.S. EPA issued a Unilateral Administrative Order, Docket No. V-W-96-353 ("Lindsay Light UAO") to the owner of 316 E. Illinois and also to Kerr-McGee Chemical Corporation (succeeded by Tronox LLC) ("Tronox"). The Lindsay Light UAO was amended in 2000 to include property on North Columbus Drive directly across the street from 316 E. Illinois. U.S. EPA since has identified eleven (11) additional removal action operable units associated with the Lindsay Light II facility and, to date, pursuant to U.S. EPA orders, approximately 50,000 cubic yards of thorium-contaminated material associated with the Lindsay Light II facility have been removed from the Streeterville area.

e. The Site is located at 245 East Ohio Street which is the southwest corner of East Ohio Street and North Fairbanks Court in Chicago, Illinois. It is approximately one city block east of 316 East Illinois Street, the Lindsay Light II removal site. The Site historically has been operated as a gas station, and later as an asphalt-covered parking lot, including a small hot-dog stand and two (2) large commercial billboards.

f. By letter dated July 31, 2000, U.S. EPA informed representatives of the D'Ancona Trust that U.S. EPA was investigating the disposal of radioactive materials from Lindsay Light in the area, and further requesting access to the Site to perform a walkover radiological survey to investigate the Site. Representatives of the D'Ancona Trust granted permission to U.S. EPA to perform the walkover survey.

g. U.S. EPA conducted a walkover survey of the Site on September 28 and 29, 2000. U.S. EPA provided the results of the walkover survey to the D'Ancona Trust representatives by letter dated December 1, 2000. U.S. EPA's letter stated, in part, that while the walkover survey indicated that radioactive material was present under the asphalt in one (1) area, and possibly present under two (2) other areas, the radioactive material did not pose an imminent health hazard as long as the material remained shielded by the asphalt surface covering.

h. Following the U.S. EPA's walkover radiological survey, and as part of historic due diligence efforts, Respondent and the D'Ancona Trust hired consultants to perform two (2) radiological surveys of the Site. The results of these studies confirmed that the presence of thorium contamination exceeding the established cleanup level and were provided to U.S. EPA

i. As of the Effective Date, the asphalt surface has remained in place.

j. Respondent plans to initiate excavation and construction at the Site in 2008.

k. Subsurface thorium contamination exceeding the established cleanup level has been identified at the Site. Respondent intends to identify and remove radioactively contaminated soil from the entire Site in accordance with the Work Plan.

- l. Respondent performed Phase I and Phase II Environmental Site Assessments at the Site.
- m. Respondent has participated in meetings with U.S. EPA regarding the Work Plan.
- n. On Friday, May 23, 2008, Respondent purchased the Site from the D'Ancona Trust.
- o. On August 4, 2005 U.S. EPA notified Tronox that pursuant to CERCLA and the Lindsay Light UAO, that Tronox was a potentially responsible party at the Site.
- p. Respondent is of the view that it has qualified as a Bona Fide Prospective Purchaser of the Site in accordance with Section 101(40) of CERCLA, 42 U.S.C. § 9601(40).

V. CONCLUSIONS OF LAW AND DETERMINATIONS

10. Based on the Findings of Fact set forth above, and the Administrative Record supporting this removal action, U.S. EPA has determined that:

- a. The Site is a part of a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).
- b. The contamination found at the Lindsay Light II facility, as identified in the Findings of Fact above, includes a "hazardous substance" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).
- c. Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).
- d. Respondent is the current owner or operator of the Site as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1), and is jointly and severally liable for performance of response action and for response costs incurred and to be incurred at the Site.
- e. Upon exposure of or intrusion into soils beneath the asphalt covering at the Site, Respondent is the "owner" and/or "operator" of the facility at the time of disposal of hazardous substances at the facility, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(2) of CERCLA, 42 U.S.C. § 9607(a)(2).

f. The conditions described in the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility into the "environment" as defined by Sections 101(22) and 101(8) of CERCLA, 42 U.S.C. §§9601(22) and 9601(8).

g. The removal action and any institutional control required by this Settlement Agreement are necessary to protect the public health, welfare, or the environment, 42 U.S.C. § 9604(a)(1), are in the public interest, 42 U.S.C. § 9622(a), consistent with the NCP, and, if carried out in compliance with the terms of this Settlement Agreement, will be done properly and promptly by the Respondent.

VI. SETTLEMENT AGREEMENT AND ORDER

11. Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for this Site, it is hereby Ordered and Agreed that Respondent shall comply with all provisions of this Settlement Agreement, including, but not limited to, all Appendices to this Settlement Agreement and all documents incorporated by reference into this Settlement Agreement.

VII. DESIGNATION OF CONTRACTOR, PROJECT COORDINATOR, AND ON-SCENE COORDINATOR

12. Respondent has retained one (1) or more contractors to perform the Work and has notified U.S. EPA of the name(s) and qualifications of such contractor(s). Respondent shall also notify U.S. EPA of the name(s) and qualification(s) of any other contractor(s) or subcontractor(s) retained to perform the Work following the Effective Date at least 5 business days prior to commencement of their respective contract duties in furtherance of the Work. U.S. EPA has approved Respondent's radiological consultant, Eli Port of RSSI Inc. U.S. EPA retains the right to disapprove of any or all of the contractors and/or subcontractors retained by Respondent. If U.S. EPA disapproves of a selected contractor, Respondent shall retain a different contractor and shall notify U.S. EPA of that contractor's name and qualifications within three (3) business days of U.S. EPA's disapproval. The contractor must demonstrate compliance with ANSI/ASQC E-4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by submitting a copy of the proposed contractor's Quality Management Plan ("QMP"). The QMP should be prepared in accordance with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B0-1/002), or equivalent documentation as required by U.S. EPA.

13. Respondent has designated, and U.S. EPA approved, Bruce Clegg of Conestoga-Rovers & Associates ("CRA") as the Project Coordinator who shall be responsible for

administration of all actions by Respondent required by this Settlement Agreement. To the greatest extent possible, the Project Coordinator shall be present on Site or readily available during Site work. U.S. EPA retains the right to disapprove of any subsequent designated Project Coordinator. If Respondent changes the Project Coordinator, and U.S. EPA disapproves of the change, Respondent shall retain a different Project Coordinator and shall notify U.S. EPA of that person's name, address, telephone number and qualifications within four (4) business days following U.S. EPA's disapproval. Receipt by Respondent's Project Coordinator of any notice or communication from U.S. EPA relating to this Settlement Agreement shall constitute receipt by Respondent.

14. U.S. EPA has designated Verneta Simon of the Emergency Response Branch, Region 5, as its On-Scene Coordinator ("OSC"). Except as otherwise provided in this Settlement Agreement, Respondent shall direct all submissions required by this Settlement Agreement to the OSC in accordance with XXIII (Notices and Submissions). Respondent is encouraged to make submissions to U.S. EPA on recycled paper (which includes significant post consumer waste paper content where possible) and using two-sided copies.

15. U.S. EPA and Respondent shall have the right, subject to Paragraph 12, to change their respective designated OSC or Project Coordinator. U.S. EPA shall notify the Respondent, and the Respondent shall notify U.S. EPA, as early as possible before such a change is made, but in no case less than twenty-four (24) hours before such a change. The initial notification may be made orally but it shall be promptly followed by a written notice.

VIII. WORK TO BE PERFORMED

16. Respondent shall implement the removal actions required by the approved Work Plan which is attached as Appendix B and perform, at a minimum, the following removal activities in accordance with the Work Plan:

a. Based upon soil results, remove, transport and dispose of wastes or contaminants at a RCRA/CERCLA approved disposal facility in accordance with the U.S. EPA off-site rule or otherwise manage in accordance with federal, state and local environmental regulations.

b. Remove radioactive wastes or contaminants exceeding 7.1 picoCuries per gram (pCi/g) total radium (Ra-226 + Ra-228), including background, cleanup criterion and transport to and dispose of at the EnergySolutions, Inc. ("EnergySolutions"), a disposal facility in Clive, Utah licensed to accept radiological Waste Material from the Site in accordance with the U.S. EPA off-site rule.

c. If contamination is discovered within the sidewalk rights-of-ways surrounding the Site or in the utility corridors excavated or intruded upon, radiologically survey and sample as necessary to the existing curb line(s) surrounding three sides of the site and, remove thorium-contaminated soil to 7.1 picoCuries per gram (pCi/g) total radium (Ra-226 + Ra-228) including background and, at a minimum, implement 40 C.F.R. §192, if deemed necessary.

d. If any portion of the Site is not radiologically surveyed in accordance with the Work Plan due to interference by existing utilities or infrastructure or if any known contamination will remain after completion of the Work due to interference by existing utilities or infrastructure then Respondent shall identify and depict all locations at the Site that were not radiologically surveyed in accordance with the Work Plan or where any known contamination will remain after completion of the Work and shall implement U.S. EPA-approved deed restrictions or other U.S. EPA-approved institutional controls pertaining to the Site.

e. Respondent has advised U.S. EPA that it has entered into a separate agreement with Tronox ("Tronox Agreement") in which Tronox has agreed to be the owner of thorium-contaminated soils, debris, and material screened for removal from the Site. Respondent also has advised U.S. EPA that the Tronox Agreement makes Tronox responsible for the proper manifesting, transportation, and off-Site disposal at EnergySolution's Clive Utah facility, the thorium-contaminated soils, debris and material screened for removal from the Site. U.S. EPA can not enforce the Tronox Disposal Agreement, however, and, therefore, Respondent is responsible for compliance with Paragraph 16(b).

17. Work Plan and Implementation. Respondent shall implement the Work Plan, attached as Appendix B, which has been approved in writing by U.S. EPA. Respondent shall provide U.S. EPA with five (5) business days advance notice of the implementation of the Work Plan. The Work Plan shall be performed in accordance with the schedule approved by U.S. EPA. The Work Plan, the schedule contained therein, and any subsequent modifications shall be incorporated into and become fully enforceable under this Settlement Agreement.

18. Health and Safety Plan. Respondent has submitted, as Appendix G to the Work Plan, for U.S. EPA review and comment, a plan that ensures the protection of the public health and safety during performance of Work under this Settlement Agreement. The Health and Safety was prepared consistent with U.S. EPA's Standard Operating Safety Guide (PUB 9285.1-03, PB 92-963414, June 1992). In addition, the plan shall comply with all currently applicable Occupational Safety and Health Administration ("OSHA") regulations found at 29 C.F.R. Part 1910. If U.S. EPA determines that it is appropriate, the plan shall also include contingency planning. Respondent shall incorporate all changes to the plan recommended by U.S. EPA and shall implement the Health and Safety Plan during the pendency of the removal action.

19. Quality Assurance and Sampling.

a. All sampling and analyses performed pursuant to this Settlement Agreement shall conform to U.S. EPA direction, approval, and guidance regarding sampling, quality assurance/quality control ("QA/QC"), data validation, and chain of custody procedures. Respondent shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990), as guidance for QA/QC and sampling. Respondent shall only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 2004, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2) (EPA/240/B-01/002, March 2001, Reissued May 2006)," or equivalent documentation as determined by U.S. EPA. U.S. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program ("NELAP") as meeting the Quality System requirements.

b. Upon request by U.S. EPA, Respondent shall have such a laboratory analyze samples submitted by U.S. EPA for QA monitoring. Respondent shall provide to U.S. EPA the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis.

c. Upon request by U.S. EPA, Respondent shall allow U.S. EPA or its authorized representatives to take split and/or duplicate samples. Respondent shall notify U.S. EPA not less than 3 business days in advance of any sample collection activity, unless shorter notice is agreed to by U.S. EPA. U.S. EPA shall have the right to take any additional samples that U.S. EPA deems necessary. Upon request, U.S. EPA shall allow Respondent to take split or duplicate samples of any samples it takes as part of its oversight of Respondent's implementation of the Work.

20. Reporting.

a. Respondent shall submit a written progress report to U.S. EPA concerning actions undertaken pursuant to this Settlement Agreement every 30th day after the date of the commencement of Work, until termination of this Settlement Agreement, unless otherwise directed in writing by the OSC. These reports shall describe all significant developments during the preceding period, including the actions performed and any problems encountered, analytical data received during the reporting period, and the developments anticipated during the next reporting period, including a schedule of actions to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

b. Respondent shall submit three (3) copies of all plans, reports or other submissions required by this Settlement Agreement, or any approved work plan. Upon request by U.S. EPA, Respondent shall submit such documents in electronic form.

c. Following Respondent's acquisition of the Site, Respondent shall prior to the conveyance of any interest in real property at the Site (excluding condominium units or parking spaces), give written notice to the transferee that the property is subject to this Settlement Agreement and written notice to U.S. EPA of the transfer or conveyance, including the name and address of the transferee. Respondent also agrees to require that its successors comply with the immediately preceding sentence and Sections IX (Site Access), X (Deed Restriction/Institutional Control Document) and XI (Access to Information).

21. Final Report. Within sixty (60) calendar days after completion of all Work required by Section VIII of this Settlement Agreement, Respondent shall submit for U.S. EPA review a final report summarizing the actions taken to comply with this Settlement Agreement. The final report shall conform, at a minimum, with the requirements set forth in Section 300.165 of the NCP entitled "OSC Reports" and with the guidance set forth in "Superfund Removal Procedures: Removal Response Reporting – POLREPS and OSC Reports" (OSWER Directive No. 9360.3-03, June 1, 1994). The final report shall include a good faith estimate of total direct costs or a statement of actual costs incurred in complying with the Settlement Agreement, a listing of quantities and types of materials removed off-Site or handled on-Site, a discussion of removal and disposal options considered for those materials, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all relevant documentation generated during the removal action (*e.g.*, manifests, invoices, bills, contracts, and permits). The final report shall also include the following certification signed by a person who supervised or directed the preparation of that report:

"Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

22. Off-Site Shipments.

a. Radioactive Waste Material. Respondent has advised U.S. EPA that Tronox LLC, successor to Kerr-McGee Chemical LLC, has agreed in writing to transport radioactive waste material to EnergySolutions, a disposal facility in Clive, Utah licensed to accept radioactive Waste Material from the Site. Prior to the initial shipment of radioactive Waste Material originating from the Site, Respondent shall provide or verify that Tronox provides written notification of such shipment to the appropriate Utah state environmental official and to the OSC.

i. Respondent shall include in the written notification the following information: 1) the name and location of the facility to which the Waste Material is to be shipped; 2) the type and quantity of the Waste Material to be shipped; 3) the expected schedule for the shipment of the Waste Material; and 4) the method of transportation. Respondent shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility.

b. Other Waste Material. If Respondent encounters any hazardous substances that are not radioactively contaminated in the course of conducting the Work, then before shipping any such non-radioactively contaminated hazardous substances, pollutants, or contaminants from the Site to an off-site location, Respondent shall obtain U.S. EPA's certification that the proposed receiving facility is operating in compliance with the requirements of CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondent shall only send hazardous substances, pollutants, or contaminants from the Site to an off-site facility that complies with the requirements of the statutory provision and regulation cited in the preceding sentence.

i. Prior to the initial shipment of non-radioactively contaminated Waste Material originating from the Site, Respondent shall provide written notification of such shipment to the appropriate state environmental official and to the On-Scene Coordinator. Respondent shall comply with the terms and conditions of the notification requirements of Paragraph 22 (a)(i) for each such shipment of non-radioactive hazardous substances, pollutants, and contaminants.

ii. The identity of any facility and state receiving the non-radioactively contaminated Waste Material will be determined by Respondent following the award of the contract for the removal action. Respondent shall provide the information required by 22(a) and 22(b) as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

IX. SITE ACCESS

23. Respondent shall, commencing on the Effective Date, provide U.S. EPA, the State, and their representatives, including contractors, with access at all reasonable times to the Site, or such other property, for the purpose of conducting any activity related to this Settlement Agreement.

24. Where any action under this Settlement Agreement is to be performed in areas owned by or in possession of someone other than Respondent, Respondent shall use its best efforts to obtain all necessary access agreements within ten (10) business days after the Effective Date, or as otherwise specified in writing by the OSC. Respondent shall immediately notify U.S. EPA if after using its best efforts it is unable to obtain such agreements. For purposes of this Paragraph, "best efforts" includes the payment of reasonable sums of money in consideration of access. Respondent shall describe in writing its efforts to obtain access. U.S. EPA may then assist Respondent in gaining access, to the extent necessary to effectuate the response actions described herein, using such means as U.S. EPA deems appropriate. Respondent shall reimburse U.S. EPA for all costs and attorney's fees incurred by the United States in obtaining such access, in accordance with the procedures in Section XVI (Payment of Response Costs).

25. Notwithstanding any provision of this Settlement Agreement, U.S. EPA and the State retain all of their access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

X. DEED RESTRICTION/INSTITUTIONAL CONTROL DOCUMENT

26. Post-Removal Site Control. Consistent with Section 300.415(l) of the NCP and OSWER Directive No. 9360.2-02, upon completion of all Work required by Section VIII of this Settlement Agreement or if any known thorium contamination exceeding total radium of 7.1 pCi/g will remain after completion of the Work then:

a. In accordance with the Work Plan, Respondent shall submit to U.S. EPA a map of the Uninvestigated or Unremediated Area, and

b. If Respondent, its contractors, representatives and agents disturb, expose or intrude upon the soils in the Uninvestigated or Unremediated area, then Respondent, their contractors, representatives and agents shall notify U.S. EPA both by telephone and in writing of plans to work in the Uninvestigated or Unremediated Area at least seventy-two (72) hours prior to (but no more than twenty-one (21) calendar days in advance of) commencing such activities. If material containing total radium in excess of 7.1 pCi/g is identified, the Respondent shall

provide a letter report to U.S. EPA explaining how the work was conducted in accordance with the Work Plan within sixty (60) days of completion of the work.

27. Within thirty (30) days of the completion of all Work required by Section VIII of the Settlement Agreement, if any portion of the Site is not radiologically surveyed in accordance with the Work Plan or if any known contamination will remain after completion of the Work, Respondent shall record, with the Recorder of Deeds, Cook County, Illinois, a deed restriction or other institutional control document ("Deed Restriction"), that U.S. EPA has approved in writing for this Site, and Respondent further agrees that the language in the Deed Restriction shall not be modified or removed from the Deed Restriction without pre-approval from U.S. EPA, as described in Paragraph 28.

a. In the event of a conveyance or transfer of property interest, Respondent's obligations under this Settlement Agreement, including, but not limited to, its obligation to provide or secure access and institutional controls, as well as to abide by such institutional controls pursuant to this Section, shall continue to be met by Respondent unless otherwise agreed to by the U.S. EPA in writing. In no event shall the conveyance or transfer of property interest release or otherwise affect the liability of Respondent to comply with all provisions of this Settlement Agreement unless otherwise agreed to among the Parties hereto in writing.

b. The intent of Respondent is to record a Deed Restriction that is applicable to all subsequent owners of the Site. The Deed Restriction will apply to any portion of the Site that is not radiologically surveyed in accordance with the Work Plan or where any known contamination will remain after completion of the Work. The Deed Restriction shall provide the following:

- i.) subject to Paragraph 28, a restriction, in perpetuity, on the disturbance of, exposure of or intrusion upon any portion of the Site that a) is not radiologically surveyed in accordance with the Work Plan or b) where any known contamination will remain;
- ii.) the right to enforce said restrictions;
- iii.) a right of access to the Site;
- iv.) prior notice of disturbance, exposure, intrusion, or excavation of the soils in any portion of the Site that is not radiologically surveyed in accordance with the Work Plan or where any known contamination will remain; and

v.) an agreement that when soils are disturbed, exposed, intruded or excavated in those areas, those activities are conducted in accordance with the Work Plan.

c. The Respondent agrees that every subsequent deed or other instrument conveying or transferring a property interest in the Site or any portion thereof shall be subject to the Deed Restriction.

28. U.S. EPA may terminate the restrictions in Paragraphs 26 and 27, in whole or in part, in writing, as authorized by law. If requested by the U.S. EPA, such writing will be executed by the Respondent in recordable form and recorded with the Recorder of Deeds, Cook County, Illinois. Respondent may modify or terminate the above restrictions in whole or in part, in writing, with the prior written approval of U.S. EPA. Respondent may seek to modify or terminate, in whole or in part, the restrictions by submitting to U.S. EPA, for approval, a written application that identifies each such restriction to be terminated or modified, describes the terms of each proposed modification and includes proposed revision(s) to the deed restriction and institutional control document described in Section X (Deed Restrictions/Institutional Control Document). Each application for termination or modification of any restriction shall include a demonstration that the requested termination or modification will not interfere with, impair or reduce protection of human health and the environment. If U.S. EPA makes a determination that an application satisfies the requirements of this Paragraph, including the criteria specified above, U.S. EPA will notify Respondent in writing. If U.S. EPA does not respond in writing to a request to change land use within ninety (90) days of its receipt of that request, unless Respondent agrees to extend this period beyond ninety (90) days, U.S. EPA may be deemed to have denied the request. If a modification to or termination of restriction is approved, Respondent shall record the revised Deed Restriction as approved by U.S. EPA, with the Recorder of Deeds, Cook County, Illinois.

XI. ACCESS TO INFORMATION

29. Respondent shall provide to U.S. EPA, upon request, copies of all documents and information within its possession or control or that of its contractors or agents relating to activities at the Site or to the implementation of this Settlement Agreement, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondent shall also make available to U.S. EPA, for purposes of investigation, information gathering, or testimony, its employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

30. Respondent may assert business confidentiality claims covering part or all of the documents or information submitted to U.S. EPA under this Settlement Agreement to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by U.S. EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to U.S. EPA, or if U.S. EPA has notified Respondent that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such documents or information without further notice to Respondent.

31. Respondent may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Respondent asserts such a privilege in lieu of providing documents, Respondent shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the contents of the document, record, or information; and 6) the privilege asserted by Respondent. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

32. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydro geologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Site.

XII. RECORD RETENTION

33. Until six (6) years after Respondent's receipt of U.S. EPA's notification pursuant to Section XXVII (Notice of Completion of Work), Respondent shall preserve and retain all non-identical copies of records and documents (including records or documents in electronic form) now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or the liability of any person under CERCLA with respect to the Site, regardless of any corporate retention policy to the contrary. Until 6 years after Respondent's receipt of U.S. EPA's notification pursuant to Section XXVII (Notice of Completion of Work), Respondent shall also instruct its contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to the performance of the Work.

34. At the conclusion of this document retention period, Respondent shall notify U.S. EPA at least sixty (60) days prior to the destruction of any such records or documents, and, upon request by U.S. EPA, Respondent shall deliver any such records or documents to U.S. EPA. Respondent may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Respondent asserts such a privilege, it shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; the name and title of each addressee and recipient; 5) a description of the subject of the document, record, or information and 6) the privilege asserted by Respondent. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

35. Respondent hereby certifies that to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information (other than identical copies) relating to its potential liability regarding the Site since notification of potential liability by U.S. EPA or the State and that it has fully complied and will fully comply with any and all U.S. EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

XIII. COMPLIANCE WITH OTHER LAWS

36. Respondent shall perform all actions required pursuant to this Settlement Agreement in accordance with all applicable local, state, and federal laws and regulations except as provided in Section 121(e) of CERCLA, 42 U.S.C. § 6921(e), and 40 C.F.R. §§ 300.400(e) and 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all on-Site actions required pursuant to this Settlement Agreement shall, to the extent practicable, as determined by U.S. EPA, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements ("ARARS") under federal environmental or state environmental or facility siting laws. The Action Memorandum for the Site identified ARARs that Respondent incorporated into the Work Plan.

XIV. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

37. In the event of any action or occurrence during performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Respondent shall immediately take all appropriate action. Respondent shall take these actions in accordance with all applicable provisions of this Settlement Agreement, including, but not limited to, the Health and Safety Plan, in order to prevent, abate or minimize such release or

endangerment caused or threatened by the release. Respondent shall also immediately notify the OSC or, in the event of her unavailability, the Regional Duty Officer, Emergency Response Branch, Region 5 at (312) 353-2318, of the incident or Site conditions. In the event that Respondent fails to take appropriate response action as required by this Paragraph, and U.S. EPA takes such action instead, Respondent shall reimburse U.S. EPA all costs of the response action not inconsistent with the NCP pursuant to XVI (Payment of Response Costs).

38. In addition, in the event of any release of a hazardous substance from the Site, Respondent shall immediately notify the OSC at (312) 353-2318 and the National Response Center at (800) 424-8802. Respondent shall submit a written report to U.S. EPA within seven (7) business days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release. This reporting requirement is in addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004, *et seq.*

XV. AUTHORITY OF ON-SCENE COORDINATOR

39. The OSC shall be responsible for overseeing Respondent's implementation of this Settlement Agreement. The OSC shall have the authority vested in an OSC by the NCP, including the authority to halt, conduct, or direct any Work required by this Settlement Agreement, or to direct any other removal action undertaken at the Site. Absence of the OSC from the Site shall not be cause for stoppage of work unless specifically directed by the OSC.

XVI. PAYMENT OF RESPONSE COSTS

40. Payment for Past Response Costs.

a. Prior to entering this Settlement Agreement, Respondent, the D'Ancona Trust and Tronox reimbursed U.S. EPA for \$51,535.00 in response costs incurred through June 30, 2006.

b. Within 30 days after the Effective Date, Respondent shall pay to U.S. EPA \$7,701.66 for Past Response Costs. Payment shall be made to U.S. EPA by Electronic Funds Transfer ("EFT") in accordance with current EFT procedures to be provided to Respondent by U.S. EPA Region 5, and shall be accompanied by a statement identifying the name and address of the party making payment, the Site name, and Site/Spill ID Number 05YT, and the U.S. EPA docket number for this action.

c. At the time of payment, Respondent shall send notice that such payment has been made to the Director, Superfund Division, U.S. EPA Region 5, 77 West Jackson Blvd., Chicago, Illinois, 60604-3590 and to Mary L. Fulghum, Associate Regional Counsel, 77 West Jackson Boulevard, C-14J, Chicago, Illinois, 60604-3590.

d. The total amount to be paid by Respondent pursuant to this Paragraph shall be deposited in the Lindsay Light II Special Account within the U.S. EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Lindsay Light II Site, or to be transferred by U.S. EPA to the U.S. EPA Hazardous Substance Superfund.

41. Payments for Future Response Costs.

a. Respondent shall pay U.S. EPA all Future Response Costs not inconsistent with the NCP. On a periodic basis, U.S. EPA will send Respondent a bill requiring payment that consists of an Itemized Cost Summary. Respondent shall make all payments within forty-five (45) calendar days of receipt of each bill requiring payment, except as otherwise provided in Paragraph 43 of this Settlement Agreement.

b. The total amount to be paid by Respondent pursuant to this Paragraph shall be deposited in the Lindsay Light II Special Account within the U.S. EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by U.S. EPA to the U.S. EPA Hazardous Substance Superfund.

42. In the event that the payment for Past Response Costs is not made within 30 days of the Effective Date, or the payments for Future Response Costs are not made within 45 days of Respondent's receipt of a bill, Respondent shall pay Interest on the unpaid balance. The Interest on Past Response Costs shall begin to accrue on the Effective Date and shall continue to accrue until the date of payment. The Interest on Future Response Costs shall begin to accrue on the date of the bill and shall continue to accrue until the date of payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondent's failure to make timely payments under this Section, including but not limited to, payment of stipulated penalties pursuant to Section XIX.

43. Respondent may dispute all or part of a bill for Future Response Costs submitted under this Settlement Agreement, only if Respondent alleges that U.S. EPA has made an accounting error, or if Respondent alleges that a cost item is inconsistent with the NCP. If any dispute over costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, Respondent shall pay the full amount of the uncontested costs to U.S. EPA as specified in Paragraph 41 on or before the due date. Within the same time period, Respondent shall pay the full amount of the contested costs

into an interest-bearing escrow account. Respondent shall simultaneously transmit a copy of both checks to the persons listed in Paragraph 40 (c) above. Respondent shall ensure that the prevailing party or parties in the dispute shall receive the amount upon which it prevailed from the escrow funds plus interest within thirty (30) calendar days after the dispute is resolved.

XVII. DISPUTE RESOLUTION

44. Unless otherwise expressly provided for in this Settlement Agreement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement Agreement. The Parties shall attempt to resolve any disagreements concerning this Settlement Agreement expeditiously and informally.

45. If Respondent objects to any U.S. EPA action taken pursuant to this Settlement Agreement, including billings for Future Response Costs, it shall notify U.S. EPA in writing of its objection(s) within ten (10) calendar days of such action, unless the objection(s) has/have been resolved informally. This written notice shall include a statement of the issues in dispute, the relevant facts upon which the dispute is based, all factual data, analysis or opinion supporting Respondent's position, and all supporting documentation on which such party relies. U.S. EPA shall provide its Statement of Position, including supporting documentation, no later than ten (10) calendar days after receipt of the written notice of dispute. In the event that these 10-day time periods for exchange of written documents may cause a delay in the work, they shall be shortened upon, and in accordance with, notice by U.S. EPA. The time periods for exchange of written documents relating to disputes over billings for response costs may be extended at the sole discretion of U.S. EPA. An administrative record of any dispute under this Section shall be maintained by U.S. EPA. The record shall include the written notification of such dispute, and the Statement of Position served pursuant to the preceding paragraph. Upon review of the administrative record, the Director of the Superfund Division, U.S. EPA Region 5, shall resolve the dispute consistent with the NCP and the terms of this Settlement Agreement.

46. Respondent's obligations under this Settlement Agreement shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, Respondent shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with U.S. EPA's decision, whichever occurs.

XIII. FORCE MAJEURE

47. Respondent agrees to perform all requirements of this Settlement Agreement within the time limits established under this Settlement Agreement, unless the performance is delayed by a *force majeure*. For purposes of this Settlement Agreement, a *force majeure* is defined as any

event arising from causes beyond the control of Respondent, or of any entity controlled by Respondent, including but not limited to its contractors and subcontractors, which delays or prevents performance of any obligation under this Settlement Agreement despite Respondent's best efforts to fulfill the obligation. *Force majeure* does not include financial inability to complete the Work or increased cost of performance.

48. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement Agreement, whether or not caused by a *force majeure* event, Respondent shall notify U.S. EPA orally within twenty-four (24) hours of when Respondent first knew that the event might cause a delay. Within seven (7) calendar days thereafter, Respondent shall provide to U.S. EPA in writing an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondent's rationale for attributing such delay to a *force majeure* event if Respondent intends to assert such a claim; and a statement as to whether, in the opinion of Respondent, such event may cause or contribute to an endangerment to public health, welfare or the environment. Failure to comply with the above requirements shall be grounds for U.S. EPA to deny Respondent an extension of time for performance. Respondent shall have the burden of demonstrating by a preponderance of the evidence that the event is a force majeure, that the delay is warranted under the circumstances, and that best efforts were exercised to avoid and mitigate the effects of the delay.

49. If U.S. EPA agrees that the delay or anticipated delay is attributable to a *force majeure* event, the time for performance of the obligations under this Settlement Agreement that are affected by the *force majeure* event will be extended by U.S. EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the *force majeure* event shall not, of itself, extend the time for performance of any other obligation. If U.S. EPA does not agree that the delay or anticipated delay has been or will be caused by a *force majeure* event, U.S. EPA will notify Respondent in writing of its decision. If U.S. EPA agrees that the delay is attributable to a *force majeure* event, U.S. EPA will notify Respondent in writing of the length of the extension, if any, for performance of the obligations affected by the *force majeure* event.

XIX. STIPULATED PENALTIES

50. Respondent shall be liable to U.S. EPA for stipulated penalties in the amounts set forth in Paragraphs 51 and 52 for failure to comply with the requirements of this Settlement Agreement specified below, unless excused under Section XIX (*Force Majeure*). "Compliance" by Respondents shall include completion of the activities under this Settlement Agreement or any work plan or other plan approved under this Settlement Agreement identified below in accordance

with all applicable requirements of this Settlement Agreement within the specified time schedules established by and approved under this Settlement Agreement.

51. Stipulated Penalty Amounts - Work.

a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in 51 (c) i, ii, iii or iv:

<u>Violation Per Day</u>	<u>Period of Noncompliance</u>
\$500.00	1 st through 14 th day
\$2,000.00	15 th through 30 th day
\$5,000.00	31 st day and beyond

b. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Paragraph 51(c)(v):

<u>1st Violation- Per Day Penalty</u>	<u>Period of Noncompliance</u>
\$ 500.00	1 st day
\$ 1,000.00	2 nd day
\$ 1,500.00	3 rd through 5 th day
\$ 3,500.00	6 th through 15 th
\$ 7,500.00	16 th day and beyond

<u>2nd Violation- Per Day Penalty</u>	<u>Period of Noncompliance</u>
\$ 1,500.00	1 st day
\$ 2,250.00	2 nd day
\$ 3,500.00	3 rd through 5 th day
\$ 5,000.00	6 th through 15 th
\$10,000.00	16 th day and beyond

<u>3rd or More Violation Per Day Penalty</u>	<u>Period of Noncompliance</u>
\$ 2,500.00	1 st day
\$ 4,000.00	2 nd day
\$ 7,500.00	3 rd through 5 th day
\$12,500.00	6 th through 15 th day
\$20,000.00	16 th day and beyond

c. Compliance Milestones

- i. Payment of Past Costs due thirty (30) days after the Effective Date of this Settlement Agreement.
- ii. Payment of Future Costs due forty-five (45) days after Respondent's receipt of demand.
- iii. Recording the Deed Restriction within 30 calendar days after completion of all Work required by Section IX of this Settlement Agreement or if Respondent suspends Work at the Site in accordance with Paragraph 4.8.3 of the Work Plan, recording the Deed Restriction within 270 days of notice to U.S. EPA that the Respondent will suspend Work at the Site or within 10 days prior to the conveyance of any ownership in the property, whichever comes first.
- iv. Submit to U.S. EPA a draft map and a final revised map of the Uninvestigated or Unremediated Area in accordance with the Work Plan upon suspension of the Work pursuant to Section 4.8.3 of the Work Plan.
- v. Seventy two-hour advance notice of intrusive work in Uninvestigated or Unremediated Area as required in Paragraph 26 b. or Section 4.8.3 of the Work Plan.

52. Stipulated Penalty Amounts - Reports. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate reports or other written documents pursuant to Paragraphs 20 and 21:

<u>Violation Per Day</u>	<u>Period of Noncompliance</u>
\$250.00	1 st through 14 th day
\$500.00	15 th through 30 th day
\$3000.00	31 st day and beyond

53. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: 1) with respect to a deficient submission under Section VIII (Work to be Performed), during the period, if any, beginning on the 31st day after U.S. EPA's receipt of such submission until the date that U.S. EPA notifies Respondent of any deficiency; and 2) with respect to a decision by the Director of the Superfund Division, Region 5, under Paragraph 45 of Section XVII (Dispute Resolution), during the period, if any, beginning on the 21st day after U.S. EPA submits its

written statement of position until the date that the Director of the Superfund Division issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Settlement Agreement.

54. Following U.S. EPA's determination that Respondent had failed to comply with a requirement of this Settlement Agreement, U.S. EPA may give Respondent written notification of the failure and describe the noncompliance. U.S. EPA may send Respondent a written demand for payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether U.S. EPA has notified Respondent of a violation.

55. All penalties accruing under this Section shall be due and payable to U.S. EPA within 30 days of Respondent's receipt from U.S. EPA of a demand for payment of the penalties, unless Respondent invokes the dispute resolution procedures under I XVII (Dispute Resolution). All payments to U.S. EPA under this Section shall be paid by certified or cashier's check made payable to "U.S. EPA Hazardous Substances Superfund," shall be mailed to U.S. Environmental Protection Agency, Program Accounting & Analysis Section, P.O. Box 70753, Chicago, Illinois 60673, shall indicate that the payment is for stipulated penalties, and shall reference the U.S. EPA Site/Spill ID Number 05YT, the U.S. EPA Docket Number, and the name and address of the party making payment. Copies of any check paid pursuant to this Section, and any accompanying transmittal letters, shall be sent to U.S. EPA as provided in Paragraph 40(c).

56. The payment of penalties shall not alter in any way Respondent's obligation to complete performance of the Work required under this Settlement Agreement.

57. Penalties shall continue to accrue during any dispute resolution period, but need not be paid until thirty (30) days after the dispute is resolved by agreement or by receipt of U.S. EPA's decision.

58. If Respondent fails to pay stipulated penalties when due, U.S. EPA may institute proceedings to collect the penalties, as well as Interest. Respondent shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 53. Nothing in this Settlement Agreement shall be construed as prohibiting, altering, or in any way limiting the ability of U.S. EPA to seek any other remedies or sanctions available by virtue of Respondent's violation of this Settlement Agreement or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Sections 106(b) and 122(l) of CERCLA, 42 U.S.C. §§ 9606(b) and 9622(l), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Provided, however, that U.S. EPA shall not seek civil penalties pursuant to Section 106(b) or 122(l) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of a willful violation of this Settlement Agreement. Should Respondent violate this Settlement Agreement or any portion hereof, U.S. EPA may carry out the required actions

unilaterally, pursuant to Section 104 of CERCLA, 42 U.S.C. §9604, and/or may seek judicial enforcement of this Settlement Agreement pursuant to Section 106 of CERCLA, 42 U.S.C. §9606. Notwithstanding any other provision of this Section, U.S. EPA may, in its unreviewable discretion, waive in writing any portion of stipulated penalties that have accrued pursuant to this Settlement Agreement.

XX. COVENANT NOT TO SUE BY U.S. EPA

59. In consideration of the actions that will be performed and the payments that will be made by Respondent under the terms of this Settlement Agreement, and except as otherwise specifically provided in this Settlement Agreement, U.S. EPA covenants not to sue or to take administrative action against Respondent pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for the Work, Past Response Costs, and Future Response Costs. This covenant not to sue shall take effect upon receipt by U.S. EPA of the Past Response Costs due under Section XVI of this Settlement Agreement and any Interest or Stipulated Penalties due for failure to pay Past Response Costs as required by Sections XVI and XIX of this Settlement Agreement. This covenant not to sue is conditioned upon the complete and satisfactory performance by Respondent of its obligations under this Settlement Agreement, including, but not limited to, payment of Future Response Costs pursuant to Section XVI. This covenant not to sue extends only to Respondent and does not extend to any other person.

XXI. RESERVATIONS OF RIGHTS BY U.S. EPA

60. Except as specifically provided in this Settlement Agreement, nothing herein shall limit the power and authority of U.S. EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing herein shall prevent U.S. EPA from seeking legal or equitable relief to enforce the terms of this Settlement Agreement. U.S. EPA also reserves the right to take any other legal or equitable action as it deems appropriate and necessary, or to require the Respondent in the future to perform additional activities pursuant to CERCLA or any other applicable law.

61. The covenant not to sue set forth in Section XX above does not pertain to any matters other than those expressly identified therein. U.S. EPA reserves, and this Settlement Agreement is without prejudice to, all rights against Respondent with respect to all other matters, including, but not limited to:

- a. claims based on a failure by Respondent to meet a requirement of this Settlement Agreement;
- b. liability for costs not included within the definitions of Past Response Costs or Future Response Costs;
- c. liability for performance of response action other than the Work;
- d. criminal liability;
- e. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments; and
- f. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Site.

XXII. COVENANT NOT TO SUE BY RESPONDENT

62. Respondent covenants not to sue and agrees not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, Past Response Costs, Future Response Costs, or this Settlement Agreement, including, but not limited to:

- a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;
- b. any claim arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the Illinois State Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or
- c. any claim against the United States pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, relating to the Site.

These covenants not to sue shall not apply in the event the United States brings a cause of action or issues an order pursuant to the reservations set forth in Paragraphs 61 (b), (c), and (e) - (f), but only to the extent that Respondent's claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

63. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXIII. OTHER CLAIMS

64. By issuance of this Settlement Agreement, the United States and U.S. EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondent. The United States or U.S. EPA shall not be deemed a party to any contract entered into by Respondent or any person not a party to this Settlement Agreement, for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

65. No action or decision by U.S. EPA pursuant to this Settlement Agreement shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XXIV. CONTRIBUTION

66. a. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2), and that Respondent is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), for “matters addressed” in this Settlement Agreement. The “matters addressed” in this Settlement Agreement are the Work, Past Response Costs, and Future Response Costs.

b. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B), pursuant to which the Respondent has, as of the Effective Date, resolved its liability to the United States for the Work, Past Response Costs, and Future Response Costs.

c. Nothing in this Settlement Agreement precludes the United States or Respondent from asserting any claims, causes of action, or demands for indemnification, contribution, or cost recovery against any persons not parties to this Settlement Agreement. Nothing herein diminishes the right of the United States, pursuant to Section 113(f)(2) and (3), 42 U.S.C. § 9613(f)(2) and (3), to pursue any such persons to obtain additional response costs or response action, and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2).

XXV. INDEMNIFICATION

67. Respondent shall indemnify, save and hold harmless the United States, its officials, agents, contractors, subcontractors, employees and representatives from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondent, its officers, directors, employees, agents, contractors, or subcontractors, in carrying out actions pursuant to this Settlement Agreement. In addition, Respondent agrees to pay the United States all costs incurred by the United States, including but not limited to attorneys fees and other expenses of litigation and settlement, arising from or on account of claims made against the United States based on negligent or other wrongful acts or omissions of Respondent, its officers, directors, employees, agents, contractors, subcontractors and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Settlement Agreement. The United States shall not be held out as a party to any contract entered into by or on behalf of Respondent in carrying out activities pursuant to this Settlement Agreement. Neither Respondent nor any such contractor shall be considered an agent of the United States. The Federal Tort Claims Act (28 U.S.C. §§ 2671, 2680) provides coverage for injury or loss of property, or injury or death caused by the negligent or wrongful act or omission of an employee of U.S. EPA while acting within the scope of his or her employment, under circumstances where U.S. EPA, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred.

68. The United States shall give Respondent notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondent prior to settling such claim.

69. Respondent waives all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between Respondent and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Respondent shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between Respondent and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

XXVI. MODIFICATIONS

70. The OSC may make modifications to any plan or schedule in writing or by oral direction. Any oral modification will be memorialized in writing by U.S. EPA promptly, but shall have as its effective date the date of the OSC's oral direction. Any other requirements of this Settlement Agreement may be modified in writing by mutual agreement of the parties.

71. If Respondent seeks permission to deviate from any approved work plan or schedule, Respondent's Project Coordinator shall submit a written request to U.S. EPA for approval outlining the proposed modification and its basis. Respondent may not proceed with the requested deviation until receiving oral or written approval from the OSC pursuant to Paragraph 70.

72. No informal advice, guidance, suggestion, or comment by the OSC or other U.S. EPA representatives regarding reports, plans, specifications, schedules, or any other writing submitted by Respondent shall relieve Respondent of its obligation to obtain any formal approval required by this Settlement Agreement; or to comply with all requirements of this Settlement Agreement, unless it is formally modified.

XXVII. NOTICE OF COMPLETION OF WORK

73. When U.S. EPA determines, after U.S. EPA's review of the Final Report, that all Work has been fully performed in accordance with this Settlement Agreement, with the exception of any continuing obligations required by this Settlement Agreement, including, *e.g.*, post-removal site controls, payment of Future Response Costs, and record retention, U.S. EPA will provide written notice of completion of Work to Respondent. If U.S. EPA determines that any such Work has not been completed in accordance with this Settlement Agreement, U.S. EPA will notify Respondent, provide a list of the deficiencies, and require that Respondent modifies the Work Plan if appropriate in order to correct such deficiencies. Respondent shall implement the modified and approved Work Plan and shall submit a modified Final Report in accordance with the U.S. EPA notice. Failure by Respondent to implement the approved modified Work Plan shall be a violation of this Settlement Agreement.

XXIX. NOTICES AND SUBMISSIONS

74. Whenever, under the terms of this Agreement, notice is required to be given or a document is required to be sent by one Party to another, it shall be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing. Written notice as specified herein shall constitute complete satisfaction of any written notice requirement of this Agreement with respect to U.S. EPA and Respondent.

Lindsay Light II, OU 6
Fairbanks Development Associates
Admin. Settlement Agreement and
Order on Consent for Removal Action
Page 30 of 33 pages

As to U.S. EPA:

Mary L. Fulghum
Cathleen M. Martwick
Associate Regional Counsel
U.S. EPA (C-14J)
77 W. Jackson Blvd.
Chicago, Illinois 60604

Verneta Simon, P.E.
On-Scene Coordinator
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Gene Jablonowski
Health Physicist
U.S. EPA (SMF-4J)
77 W. Jackson Blvd.
Chicago, Illinois 60604

Vanessa Mbogo
Comptroller's Office
U.S. EPA (MF-10J)
77 W. Jackson Blvd.
Chicago, Illinois 60604

As to Respondent:

Fairbanks Development Associates, LLC
Attention: Corporate Secretary
33 West Monroe Street
Suite 1900
Chicago, IL 60603

Thomas R. Carey
Bell, Boyd & Lloyd LLP
70 W. Madison St., Ste. 3100
Chicago, IL 60602-4207

XXIX. SEVERABILITY/INTEGRATION/APPENDICES

75. If a court issues an order that invalidates any provision of this Settlement Agreement or finds that Respondent has sufficient cause not to comply with one or more provisions of this Settlement Agreement, Respondent shall remain bound to comply with all provisions of this Settlement Agreement not invalidated or determined to be subject to a sufficient cause defense by the court's order.

76. This Settlement Agreement and its appendices constitute the final, complete and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Settlement Agreement. The parties acknowledge that there are no representations, agreements or understandings relating to the settlement other than those expressly contained in this Settlement Agreement. The following appendices are incorporated into this Settlement Agreement:

Appendix A Site Map.
Appendix B Work Plan.

XXX. EFFECTIVE DATE

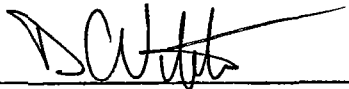
77. This Settlement Agreement shall be effective upon signature of this Settlement by the Director, Superfund Division, U.S. EPA Region 5.

Lindsay Light II, OU 6
Fairbanks Development Associates
Admin. Settlement Agreement and
Order on Consent for Removal Action
Page 32 of 33 pages

The undersigned representative of the Respondent certifies that s/he is fully authorized to enter into the terms and conditions of this Settlement Agreement and to bind the party s/he represent to this document.

Agreed this ____ day of October 2008.

For Respondent FAIRBANKS DEVELOPMENT ASSOCIATES LLC

By: 

Donald C. Vitek

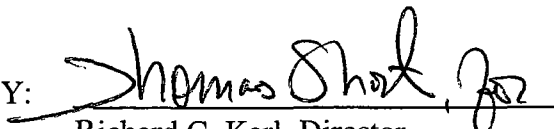
Title VP

Lindsay Light II, OU 6
Fairbanks Development Associates
Admin. Settlement Agreement and
Order on Consent for Removal Action
Page 33 of 33 pages

IN THE MATTER OF:

Lindsay Light II, OU 6
Chicago, Illinois

It is so ORDERED and Agreed this 17 day of October 2008.

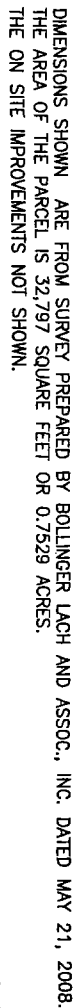
BY: 
Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency
Region 5

GRAPHIC SCALE

0 40 60 80

(IN FEET)

1 inch = 40 ft.



828-004

**PLAT FOR EXHIBIT
CHICAGO, ILLINOIS**

B

2100 HUNTINGTON DRIVE NORTH - SUITE A
ALGONQUIN, IL 60102 www.bollingerlach.com
P:(847) 854 7799 F:(847) 854 7798

PREPARED FOR:
BELL, BOYD AND LLOYD, L.L.C.
70 West Madison St. , Ste. 3100
Chicago, Illinois 60602
312-578-5431

REVISIONS:

- | | | |
|---|---|---|
| 1 | △ | revise address 8-21-08 |
| 1 | 2 | revise add off alle pavement
and bldg. 8-22-08 |
| | 3 | |
| | 4 | |

DRAWN BY: TMS

DRAWING FILE: 828-004ED080T.DWG

COMPLETED rev. : 08-22-08



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

VIA FACSIMILE (773) 380-6421 AND U.S. MAIL

REPLY TO THE ATTENTION OF

SE-5J

Mr. Bruce Clegg
Conestoga-Rovers & Associates, Inc.
8615 West Bryn Mawr
Chicago, Illinois 60631

RE: Lindsay Light II/ OU6 (Formerly 246 East Ohio/247 East Ohio, now 245 East Ohio)/
Fairbanks Development Associates, LLC, Chicago, Illinois

Dear Mr. Clegg:

U. S. EPA has reviewed and approved the Conestoga-Rovers Associates August 2008 Removal Action Work Plan as revised by U.S. EPA's August 19, 2008 letter for the above-referenced location (the "Work Plan"). This Work Plan will be Exhibit B to the Lindsay Light II Site OU6 Administrative Settlement Agreement and Order on Consent that we anticipate to be executed in the next few days.

If you have any questions or would like to further discuss a matter, please contact me at (312) 886-3601.

Sincerely,

A handwritten signature in cursive script that reads "Verneta Simon".

Verneta Simon
On-Scene Coordinator

REMOVAL ACTION WORK PLAN

FAIRBANKS AND OHIO AUTOPARK
CHICAGO, ILLINOIS

SEPTEMBER 2008
REF. NO. 017770 (2)
This report is printed on recycled paper.

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attendant's booth were normal background levels. The U.S. EPA concluded that none of these areas pose an immediate health hazard. However, the risk for contamination of people and equipment would rise if the asphalt were removed, exposing underlying soils.

The presence of soils containing elevated levels of radioactive thorium on the Property was confirmed during an investigation completed in February 2001. Subsequently, CRA conducted a more comprehensive Property Investigation at the Site in April 2001 to evaluate the Property from the perspective of assessing subsurface radiation relative to naturally occurring background radiation levels in local unimpacted soils and to evaluate the potential volume of soil containing elevated radiation levels. The results of the April 2001 investigation reconfirmed the presence of radioactive materials in the soil in at least two areas along the western portion of the Site at levels above the cleanup level established by the U.S. EPA for the Lindsay Light Site of 7.1 pCi/g of Ra-226 + Ra-228 (total radium).

1.2 PURPOSE AND ORGANIZATION OF WORK PLAN

The purpose of this work plan is to provide information on the Site background, previous studies, and procedures for undertaking remediation of the Site.

This report is organized as follows:

- Section 1: Introduction;
- Section 2: Presents information relating to Site background and history;
- Section 3: Presents information relating to previous investigations;
- Section 4: Presents a description of procedures for the remediation activities;
- Section 5: Presents project reporting requirements; and
- Section 6: Presents Work Plan approval conditions.

1.0 INTRODUCTION

1.1 GENERAL

Conestoga-Rovers & Associates (CRA) was retained by Bell, Boyd & Lloyd L.L.C. to develop a Removal Action (RA) Work Plan for remediation of property located at the southwest corner of East Ohio Street and North Fairbanks Court in Chicago, Illinois (Property or Site). The Site is currently occupied by an active pay parking lot, a fast food restaurant, and a vacant metal building. Remediation of the Site is to be undertaken in support of planned redevelopment including construction of a high-rise, multi-use building. The remediation program is being undertaken pursuant to a Administrative Settlement Agreement and Order on Consent with the United States Environmental Protection Agency (U.S. EPA).

The Site is located in proximity to the Lindsay Light II Superfund Removal Site where soils containing radioactive thorium have been previously identified and remediated. The Lindsay Light Chemical Company is the former maker of incandescent gas mantles used for home and street lighting. Based on documentation reviewed by CRA, the Lindsay Light Chemical Company manufactured mantles circa 1906 until 1933 at 161 East Grand Avenue. The process of gas mantle manufacturing involves dipping fabric into solutions containing thorium nitrate and small amounts of cerium, beryllium and magnesium nitrates and forming the material into the finished product. The principal ingredient in thorium nitrate is radioactive thorium, specifically thorium-232. On June 3, 1993, the U.S. EPA and the Illinois Department of Nuclear Safety (IDNS) conducted a joint investigation at the Lindsay Light II Site. This investigation indicated the presence of radioactivity at levels above natural background levels. As reported by U.S. EPA, exposure rates up to 280 micro-Roentgens per hour ($\mu\text{R/hr}$) were measured. U.S. EPA reported background measurements at the Lindsay Light II Site at 20 $\mu\text{R/hr}$.

On September 28 and 29, 2000, the U.S. EPA conducted a radiation walkover survey of the Site (245 East Ohio Street) to determine whether there were any elevated radiation readings at the surface that might indicate the presence of subsurface radioactive materials. According to a letter issued by the U.S. EPA, dated December 1, 2000, elevated readings were found in three areas located on the Property. A copy of the letter is provided in Appendix A. Elevated readings were detected at an area along the west side of the Site. The other two areas were reported to be small and were located near the south-center of the lot and at the southeast corner of the lot. According to the U.S. EPA's letter, the survey indicated that radioactive material was present under the asphalt in one area (west side of the Property) and possibly in the other two areas. The U.S. EPA determined that the radiation levels around the fast food restaurant and in the

2.0 SITE BACKGROUND AND HISTORY

As part of previous work to evaluate Site background and history, CRA conducted an assessment of publicly available database information, and conducted an inspection of the Site in October 2002 (hereafter referred to as "Site inspection"). The Site inspection was part of a Phase I Environmental Site Assessment performed in accordance with ASTM Standard E1527-00. The database information that was reviewed by CRA is identified and discussed herein, but has not been reproduced due to volume. It is noted that the assessment presented herein includes the results of an updated database review and Site inspection conducted in December 2005.

2.1 SITE LOCATION

The Site is located at the southwest corner of East Ohio Street and North Fairbanks Court in Chicago, Illinois. A Site location map is provided on Figure 2.1. A Site plan is provided on Figure 2.2.

2.2 SITE OVERVIEW

The Site consists primarily of an approximately 32,700 square foot asphalt-paved active pay parking lot located at the southwest corner of East Ohio Street and North Fairbanks Court in Chicago, Illinois. Improvements to the Site consist of three buildings including a fast food restaurant (Hot Diggity Dog), a vacant metal building with an exterior ATM, and an attendant's booth for the parking lot attendants. The fast food restaurant and vacant building are prefabricated metal buildings constructed in approximately 1993. Based on documentation reviewed by CRA, several addresses have been used for the Site including the following: 253 East Ohio Street; 251 East Ohio Street (currently Hot Diggity Dog); 247 East Ohio Street (currently vacant metal building); 245 East Ohio Street; 243 East Ohio Street; and 242 to 256 East Grand Avenue.

2.3 ENVIRONMENTAL SETTING/ADJACENT PROPERTIES

The Site is rectangular in shape and is located in a commercial area of Chicago, Cook County, Illinois. East Ohio Street and North Fairbanks Court provide access to and egress from the Site. The Property is situated on relatively flat terrain. No stressed vegetation, stained soils, or surficial evidence of fill were observed on the Property during the Site inspection.

The Site is bordered:

- to the north by East Ohio Street with a vacant lot and lofts/offices located beyond;
- to the west by businesses including Emilio's Tapas Restaurant, Grand Ohio Condo, and Fast Signs with lofts located above the businesses;
- to the south by East Grand Avenue with a Dominick's grocery store located beyond;
- to the east by Fairbanks Court and beyond by the Chicago Time Life Office Building; and
- to the northeast by Holiday Inn and McClurg Court Center.

No evidence of adverse impact to the Site from the adjacent properties was observed by CRA during previous Site inspections. The following adjacent properties were listed in environmental databases searched previously:

- The Lindsay Light II Site is located on the southern adjacent property and was on the CERCLIS list. The Lindsay Light II Site is located at 316 East Illinois Street. The three-acre lot is bordered by Grand Avenue, Illinois Street, McClurg Court, and Columbus Drive. Records show that the Lindsay Light II Site originally housed a stable, which was later used as a laboratory/processing facility by the former Lindsay Light Chemical Company.
- Holiday Inn is located northeast of the Site at 300 East Ohio Street and was listed in the RCRIS-SQG Report.
- The Chicago Time Life Building is located on the eastern adjacent property, east of North Fairbanks Court and was listed in the RCRIS-SQG Report. A business located within the Chicago Time Life Building (Skyview Film & Video) was also listed in the RCRIS-SQG Report. No violations were noted for either Site in the RCRIS-SQG Report.
- A vacant parking lot located at 255 East Ohio Street was listed in the Illinois Underground Storage Tank (UST) Report as having three removed USTs. The exact location of this parking lot is unknown by CRA.
- An Amoco Service Station was historically located on the northern adjacent property at 252 East Ohio Street and was listed in the Illinois UST Report as having three removed USTs. The Amoco Station was also listed in the Illinois Leaking Underground Storage Tank (LUST) Report as having a closed status, dated December 28, 1999. This Amoco Service Station is no longer present at the 252 East Ohio Street address.

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boundaries. In early February 2000, contractors for the City of Chicago conducting a sewer line replacement project along Illinois Street adjacent to the Lindsay Light II Site discovered off-site thorium contamination. Later that month, U.S. EPA discovered thorium contamination at the Grand Pier Center L.L.C. ("Grand Pier") development across the street and directly west of the Lindsay Light II Site. On March 29, 2000, U.S. EPA issued the First Amendment to the UAO that amended the Lindsay Light II Site definition to include property directly west of and across the street from the Site, and which was designated as "RV3/ North Columbus Drive." Pursuant to the Amended UAO, Grand Pier, through their consultants, STS Consultants Ltd. ("STS"), submitted a work plan to U.S. EPA on March 20, 2000. U.S. EPA approved the work plan on March 23, 2000. In total, over 10,000 tons of thorium-contaminated soil were excavated from the Grand Pier site and shipped to Envirocare (n/k/a "Energy Solutions, Inc.") in Clive, Utah for disposal. STS submitted a final report on their activities at the Grand Pier site as required by the UAO. U.S. EPA issued its Completion of Work letter for the Grand Pier site on August 26, 2002.

2.5 SITE HISTORY

2.5.1 HISTORICAL OWNERSHIP

Based on documentation reviewed by CRA, a filling station historically occupied the northern portion of the Site circa 1950 until 1975. Based on a review of Sanborn Maps, a warehouse and garage occupied the southern portion of the Site circa 1950 until sometime between 1950 and 1974. According to Site personnel, structures at the Site were used as a horse barn sometime in the 1940s.

Based on a review of city directories, Robertson Auto Repair/Robertson Hans Garage historically occupied the 245 East Ohio Street address. Suker Jacob R MD and Lemmy's Devilishly Hot Dogs historically occupied the building currently occupied by Hot Diggity Dog (251 East Ohio Street). Fairbanks and Ohio Auto Park have occupied the Site (243 East Ohio Street) circa 1961 until the present. No information was available on the other associated addresses.

2.5.2 SANBORN FIRE INSURANCE MAP ASSESSMENT

Sanborn Fire Insurance Maps assist in the identification of historical land use and commonly indicate the existence and location of aboveground and underground storage tanks, structures, improvements, and facility operations. Sanborn Maps for the years

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No other adjacent properties were listed in any of the databases searched.

During CRA's Property Investigation conducted in April 2001, two main stratigraphic units were encountered within the upper 13 feet of soil beneath the Site. The first unit consisted of fill material that was encountered in all of the soil borings. The fill material consisted mainly of silt, sand, and clay with varying amounts of gravel. In addition, the fill material also contained varying amounts of rubble consisting of brick fragments, concrete and minor amounts of slag, coal, glass, and wood. The fill material was underlain by native sand. The sand consisted mainly of fine-grained dense sand that was tan or gray in color. Based on documentation reviewed by CRA, groundwater flow direction beneath the Site is in a southeasterly direction. The Site is not located within a flood hazard area. No surface water is located on the Property. The closest body of water to the Site is the Chicago River located approximately 1,000 feet south of the Site. Lake Michigan is located approximately 2,000 feet east of the Site. CRA is unaware of any current groundwater use in the vicinity of the Site.

2.4 LINDSAY LIGHT II (JUNE 1996 UAO/GRAND PIER UAO AMENDMENT)

Beginning in about 1904 and continuing through the early 1930s, the Lindsay Light and Chemical Company manufactured gaslight mantles impregnated with thorium in the City of Chicago. Lindsay Light operations originated at 22 W. Hubbard and later expanded to 161 E. Grand and 316 E. Illinois in Chicago, Illinois. The 316 E. Illinois address was the location where thorium was reportedly extracted from radioactive ores. The Hubbard and Grand sites are believed to be the locations where thorium was used to manufacture mantles. These Lindsay Light refining and manufacturing processes created radioactive residuals that were used as fill in undetermined locations. Pursuant to an Administrative Order by Consent ("AOC") authorized by Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA") dated January 27, 1994, the Lindsay Light II property owner, Chicago Dock & Canal Trust ("Chicago Dock") characterized the thorium contamination present within the Lindsay Light II site at 316 East Illinois. On June 6, 1996, U.S. EPA issued a Unilateral Administrative Order, Docket No. V-W-96-C-353, (the "UAO"). The UAO required the Respondents, Kerr McGee Corporation and Chicago Dock, to remove thorium contaminated materials from the Lindsay Light II Site and to conduct off-site surveying and sampling as necessary and, at a minimum, implement the standards of 40 CFR § 192 if deemed necessary should contamination be discovered beyond current site

¹ Information in Section 2.4 was obtained from various U.S. EPA documents.

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1903, 1906, 1927, 1950, 1974, 1988, 1990, and 1994 were available from EDR and reviewed by CRA. The following is a summary of observations based on review of the Sanborn Maps:

1903: The 1903 Sanborn Map shows the Site to be vacant and undeveloped. Ohio Street is observed north of the Site with vacant land located beyond. A street referred to as "Boulevard" is observed east of the Site with vacant land located beyond. Indiana Avenue is observed south of the Site with a store located beyond. Vacant land is observed west of the Site with stores located beyond.

1906: The 1906 Sanborn Map shows the Site to be vacant and undeveloped. Ohio Street is observed north of the Site with vacant land located beyond. Fairbanks Court is observed east of the Site with a vacant lot located beyond. A vacant lot is observed west of the Site with warehouses and stores located beyond. Indiana Avenue is observed south of the Site. The property located south of the Site, south of Indiana Avenue is not indicated on the map.

1927: The 1927 Sanborn Map shows the northeastern portion of the Site to be vacant and undeveloped. The remainder of the Site consists of unidentified two-story structures without basements. The remaining adjacent properties are consistent with the 1906 Sanborn Map.

1950: The 1950 Sanborn Map shows the northern portion of the Site to be occupied by a filling station (253 East Ohio Street) and a two-story garage (245-251 East Ohio Street). The southern portion of the Site is occupied by a private garage (245-248 East Grand Avenue), a furniture warehouse (250-252 East Grand Avenue) and a "garage capacity 25 cars" (254-256 East Grand Avenue). East Ohio Street is observed north of the Site with a filling station located beyond at the northwest corner of North Fairbanks Court and East Ohio Street. North Fairbanks Court is observed east of the Site with a filling station (301 East Ohio Street) located beyond. East Grand Avenue is located south of the Site. A stove testing facility (228-230 East Grand Avenue), a motor freight station (232-234 East Grand Avenue) and a building used for magazine distribution on the first floor and fixture storage on the second floor (238-240 East Grand Avenue) is located southwest of the Site. The property located south of East Grand Avenue is not indicated on the map.

1974: The 1974 Sanborn Map shows the Site to be occupied by a filling station at the north end of the Site. The southern portion of the Site is vacant. The filling station located north of the Site at the northwest corner of North Fairbanks Court and East Ohio Street that was observed in the 1950 Sanborn Map is no longer present; however, a filling station is observed at the northwest corner of this property. North Fairbanks Court is observed east of the Site with the Chicago

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Time-Life Office Building located beyond. The western adjacent property is vacant with Underwriters Laboratories located beyond. East Grand Avenue is located south of the Site. The property located south of East Grand Avenue is not indicated on the map.

1988: The 1988 Sanborn Map shows the Site to be occupied by two buildings and a parking lot. A filling station is observed north of the Site, north of East Ohio Street in the central portion of the lot. The remaining adjacent properties remain consistent with the 1974 Sanborn Map.

1990: The 1990 Sanborn Map shows the Site to be consistent with the 1988 Sanborn Map. East Ohio Street is observed north of the Site with a parking lot located beyond. A Holiday Inn is observed northeast of the Site at the northeast corner of North Fairbanks Court and East Ohio Street. A parking lot is observed west of the Site. The remaining adjacent properties remain consistent with the 1988 Sanborn Map.

1994: The 1994 Sanborn Map shows the Site and adjacent properties to be in the same basic configuration as the 1990 Sanborn Map.

2.5.3 PROPERTY TITLE SEARCH

CRA contracted NCO Financial Systems, Inc. (NCO) to conduct a search of property title records and other documents (lease agreements, easements, etc.) dated from April 21, 1949 to August 30, 2002, associated with ownership or occupation of the Site. Based on the original Site address information provided to CRA, the title search was conducted for the 247 East Ohio Street address only. The following entities were reported to be associated with ownership or occupation of the above-mentioned Site address or portions of the Site during the specified time periods:

Grantor	Grantee	Date
D.S. Boyd, et al	Underwriters Laboratories, Inc.	April 21, 1949
Underwriters Laboratories, Inc. and American National Bank Trust Number 8239	Henry R. Levy, formerly Studebaker Sales Company	May 19, 1959
Henry R. Levy Company	Mae Daum	January 31, 1972
Mae Daum	Exchange National Bank and Trust, as Trustee under Trust Number	November 3, 1976

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observed east of the Site, east of North Fairbanks Court. An unidentified building (possibly a filling station) and several vehicles are observed north of the Site, north of East Ohio Street. A parking lot and building containing several businesses are observed west of the Site.

1988: The 1988 aerial photograph shows the Site and adjacent properties to be consistent with the 1972 aerial photograph.

1999: The 1999 aerial photograph shows the Site to be developed with a parking lot and the current on-Site structures. A parking lot is observed south of the Site, south of East Grand Avenue. The Chicago Time Life Office Building is observed east of the Site, east of North Fairbanks Court. A parking lot and a building containing several businesses are located west of the Site. What appears to be a vacant lot is located north of the Site, north of East Ohio Street.

2.5.5 CITY DIRECTORIES REVIEW

City directories provide a listing of current and historic occupants of a building address. A city directory search was conducted by EDR from the earliest available directory to the present. Directories were available and were reviewed by EDR at approximately 5 year intervals starting in 1923 and ending in 1999.

The Site address (245 East Ohio Street) was listed in the 1931 city directory as Robertson Auto Repair Shop/Robertson Hans Garage. The Site address (251 East Ohio Street) was listed in the 1961 city directory as Suker Jacob R.M.D., in the 1976, 1981, and 1986 city directories as Lemmy's Devilishly Delicious Hot Dogs, and in the 1993 city directory as Hot Diggity Dog. The Site address (243 East Ohio Street) was listed in the 1961, 1966, 1971, 1976, 1981, 1986, and 1993 city directories as Fairbanks and Ohio Auto Park. No information for any of the other Site addresses or adjacent properties was reported in the city directory search.

2.6 EXISTING OPERATIONS AND FEATURES

2.6.1 GENERAL

The Site is currently occupied by an active pay parking lot, a fast food restaurant, and a vacant metal building.

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Grantor	Grantee	Date
Exchange National Bank and Trust, as Trustee under Trust Number 26143	Blanche Kirian	November 3, 1976
Blanche Kirian	American National Bank and Trust Company of Chicago, as Trustee under the provisions of a certain Trust Agreement dated the 27th day of October 1976 and known as Trust Number 39369	November 3, 1976

No leases, easements, or environmental liens were reported to be associated with the Site.

2.5.4 AERIAL PHOTOGRAPH ANALYSIS

Aerial photographs assist in the identification of Site features and outdoor activities of potential environmental concern. Aerial photographs for the years 1952, 1962, 1972, 1988, and 1999 were obtained from Historic Information Gathers (HIG) and were reviewed by CRA. All of the aerial photographs were reviewed at a scale of 1 inch equals approximately 500 feet. The following is a summary of CRA's interpretation of features observed on the aerial photographs:

1952: The 1952 aerial photograph shows the Site to be developed with unidentified buildings. A vacant lot is located north of the Site, north of East Ohio Street. North Fairbanks Court is located east of the Site with what appears to be a filling station located beyond. Unidentified buildings are located west of the Site and south of the Site, south of East Grand Avenue.

1962: The 1962 aerial photograph shows the Site to be developed with a building and a parking lot encumbered with numerous vehicles. What appears to be a filling station is located north of the Site, north of East Ohio Street. The remaining adjacent properties are consistent with how they appeared in the 1952 aerial photograph.

1972: The 1972 aerial photograph shows the Site to be in the same basic configuration as the 1962 aerial photograph. What appears to be a parking garage is observed south of the Site. A building (currently the Chicago Time Life Office Building) is

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2.6.2 UTILITY SERVICES

Commonwealth Edison (ComEd) provides electricity to the Site through overhead service connections. The fast food restaurant (Hot Diggity Dog) is heated by natural gas while cooling is provided by a roof-mounted central air-conditioning unit. Stormwater from the Site is collected through storm drains located along the roadways and discharges to the municipal storm sewer.

The City of Chicago provides potable water and sanitary sewer services to the Site. Site personnel were not aware of any on-Site septic systems or potable water wells either in use currently or historically at the Site. No evidence of on-Site potable water wells or septic systems have been observed.

2.6.3 UNDERGROUND STORAGE TANKS (USTs)

According to Site personnel, there currently are no USTs in service or located at the Site. No evidence of on-Site USTs (e.g., vent or fill pipes, etc.) was observed by CRA during the Site inspection.

The Site address (247 East Ohio Street) was listed in the Illinois LUST Report as Dancona [sic] & Company and was reported as having a closed status, dated March 3, 2005.

Based on documentation reviewed by CRA, a filling station historically occupied the northern portion of the Site circa 1950 until 1975. Based upon a 45 Day Report prepared by Miller Environmental Management, Inc. dated April 20, 1994 and submitted to the Illinois Environmental Protection Agency (IEPA), one 1,000-gallon and two 550-gallon USTs were removed from the Site on February 8, 1994 by RTE Environmental Solutions, Inc. These three USTs were located at the northeastern quadrant of the Site and were between 5 and 10 feet below grade. Upon removal of the USTs, petroleum-degraded soils were observed by a representative of the Office of the State Fire Marshall (OSFM) overseeing the UST removals. In accordance with State and Federal regulations then in effect, a release was reported to the Illinois Emergency Management Agency (IEMA) and incident number 94-0293 was issued for the Site. The USTs were reported in the 45 Day Report as containing no product or sludges. UST excavation overburden is also reported as having been placed back in the excavation pending remedial activities. Subsequent soil and groundwater investigations were conducted at a later date based on the reported release. This investigation is discussed further in Section 3.2.

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2.6.4 WASTEWATER/SEWERS

No process wastewaters are generated at the Site. Wastewater generated at the Site consists of domestic wastewater from the buildings located on the Property. Wastewaters are discharged to the municipal sanitary sewer system.

2.6.5 STORMWATER

Stormwater runoff from the Property includes rainwater from the building roofs, parking lot, and the surrounding grounds. Stormwater from the Property is directed towards storm drains located in the adjacent roadways.

2.6.6 ASBESTOS CONTAINING MATERIALS (ACM)

An asbestos survey has not been conducted for this Site; however, potential ACM observed previously include ceiling tiles and 12-inch by 12-inch floor tiles in the fast food restaurant and 12-inch by 12-inch floor tiles in the vacant building. These materials have been observed to be in good condition.

3.0 INVESTIGATIVE HISTORY

3.1 OVERVIEW

Previous investigations at the Site, conducted by others and known to CRA, include the following:

- investigation of the potential petroleum releases associated with the former filling station located on the northern part of the Site, as reported in April 1997; and
- radiation walkover survey conducted by U.S. EPA in September 2000.

Site primary investigations conducted by CRA include the following:

- property walkover investigation (February 2001); and
- subsurface investigation (April 2001).

The results of these investigations, which are also described in the Phase I Environmental Site Assessment (October 2002), are discussed in the following subsections.

3.2 FOCUSED SITE INVESTIGATION SUMMARY REPORT ISCHRACK APRIL 1997

A *Focused Site Investigation Summary Report* was prepared by Schrack Environmental Consulting, Inc. (Schrack) in April 1997. Schrack's report discussed an investigation regarding the potential presence of petroleum contamination resulting from a former filling station operated at the Site known as 243 East Grand Avenue. According to Schrack's report, Schrack completed fifteen soil borings and six groundwater monitoring wells at the Site in order to define the extent of contamination present and determine the level of remedial efforts necessary to obtain a No Further Action determination from the State. The soil boring and groundwater monitoring well locations are illustrated on Figure 3.1. The results of the on-Site soil and groundwater sampling as summarized by Schrack verified benzene, toluene, ethylbenzene, and xylene (BTEX) concentrations below the applicable Tier I Soil and Groundwater Remediation Objectives (Tiered Approach to Corrective Action Objectives for Residential Properties - Inhalation and Ingestion Values) in all fifteen soil samples and in five of the six groundwater samples. A groundwater sample collected from a monitoring well installed at the northeast corner

of the Site (MW-2) contained a benzene concentration in excess of the identified Remediation Objectives.

Based on the initial analytical results, Schrack completed three additional soil borings and groundwater monitoring wells in North Fairbanks Court to investigate subsurface conditions in the downgradient direction from the northeast corner monitoring well location. However, due to the presence of numerous underground utilities in East Ohio Street, soil borings and monitoring wells could not be completed in the upgradient direction from the northeast corner monitoring well. According to Schrack's report, the results of the analyses completed on the additional soil and groundwater samples verified BTEX concentrations below the applicable Tier I Soil and Groundwater Remediation Objectives. Schrack's report also indicated that the shallow groundwater aquifer flows in a southeasterly direction. Moreover, Schrack's report stated that the northeast corner monitoring well (MW-2) is located hydraulically upgradient from the underground storage tank systems formerly located at the Site. Schrack concluded that the benzene discovered at the northeast corner of the Site may have been caused by releases from a former LUST site located directly upgradient of the Site (or from dispersion of dissolved-phase petroleum contaminants into the shallow aquifer caused by releases from the former pump island and underground piping associated with the UST systems formerly operated at the Site). Schrack recommended that a Focused Site Investigation Summary Report and Remedial Action Plan be submitted to the IEPA for review and approval.

A comparison of the groundwater analytical results from Schrack's report to the current groundwater standards listed in Table E of Appendix B of 35 Illinois Administrative Code 742 - Tiered Approach to Corrective Action Objectives (TACO) indicates that five of the monitoring wells had exceedences of the Class I or Class II groundwater standards. The benzene concentration in several monitoring wells (MW-1, MW-2, MW-3, MW-6, and MW-7) exceeded the Class I groundwater standard. Excluding the results from MW-1, the benzene concentration from the remaining four monitoring wells also exceeded the Class II groundwater standard. The groundwater results from MW-2 also exceeded the Class I and II groundwater standards for toluene, ethylbenzene, and xylenes. It should be noted that the City of Chicago has a Memorandum of Understanding (MOU) with the IEPA prohibiting groundwater use within the City, thereby eliminating the groundwater exposure pathway.

CRA also compared Schrack's soil analytical results to the current TACO Tier I soil remediation objectives. This comparison confirmed Schrack's conclusion that the soil analytical results were below the TACO Tier I soil ingestion and inhalation remediation objectives. However, the concentration of ethylbenzene in the soil sample collected from

soil boring DKS4 exceeded the soil component of the groundwater ingestion exposure route for Class I groundwater.

3.3 UST CLOSURE ACTIVITIES UNDERTAKEN BY CRA

As stated in Section 2.6.3 above, the presence and removal of three USTs located at the northeastern quadrant of the Site was originally reported to IEPA in February of 1994 and assigned IEPA Incident Number 940293 under IEPA's Leaking Underground Storage Tank Program. A 45 Day Report describing the UST removal was subsequently sent to IEPA in April of 1994. Following the additional subsurface investigations conducted in 1997 as described in Section 3.2 above, in approximately January of 2004, CRA was retained to further investigate the groundwater situation at the former UST location and to obtain closure of the incident by obtaining a No Further Remediation (NFR) letter from IEPA. CRA performed the necessary follow-up investigation work and prepared a "Focused Site Investigation Report, Remedial Action Plan, Remedial Completion Report" dated September 7, 2004 and submitted to IEPA the same day. A copy of this report was provided to U.S. EPA, as well. IEPA issued its NFR letter closing out the UST incident number 940293 on December 30, 2004. An overlay of the UST excavation location diagram with a radiation survey contour map prepared by CRA in 2001 (see Section 3.6 below) indicates that the UST excavation is not located within an area of elevated radiation measurements. Accordingly, CRA does not believe that subsurface conditions in the area of the former UST excavation will impact any removal actions to be conducted pursuant to this Work Plan. A copy of this overlay is presented at Appendix H.

3.4 RADIATION WALKOVER SURVEY (U.S. EPA SEPTEMBER 2000)

A radiation walkover survey of the Site was conducted by U.S. EPA on September 28 and 29, 2000. According to the letter from U.S. EPA dated December 1, 2000 (provided in Appendix A), the procedure was as follows:

- measurements were taken using a probe held about 6 inches off the ground, along parallel lines approximately 3-4 feet apart, to assess the range of values, and determine areas of elevated radiation levels;
- 30 second counts, in contact with the ground, were taken at regular intervals (in the center of each parking space and down the centerline of the driveway) to quantify the radiation level;

- measurements were also taken at selected spots where initial readings were distinct from background levels; and
- exposure rate measurements were made at the hot dog restaurant and in the attendant booth.

The results from the survey were stated as follows: "Readings ranged from 1,890 counts per 30 seconds to 4,225 counts per 30 seconds. Spots along the west side reached as high as 16,061 counts per 30 seconds. All readings were on contact. Exposure rate measurements ranged from 5 to 6 micro-Roentgen per hour."

Based on the survey results, U.S. EPA determined that elevated readings were observed in three locations: one of these is distinctly elevated from background levels and is toward the west side of the lot, in the parking spaces near the building wall; and the other two seem to be small and are near the south-center of the lot and on the southeast corner of the lot, along the barricade. It was further indicated that the levels at the hot dog stand and the attendant booth were considered to be normal background and none of the areas pose an immediate health hazard but the risk would rise appreciably if the asphalt was removed.

3.5 PROPERTY INVESTIGATION [CRA FEBRUARY 2001]

CRA completed a limited Property Investigation in February 2001 at the Site (247 East Ohio Street). The purpose of this investigation was to evaluate the Site from the perspective of assessing subsurface radiation relative to naturally occurring background radiation levels in local unimpaired soils. Investigative activities undertaken consisted of the following:

- completion of a surficial walkover survey of the Property;
- installation and sampling of four soil borings at locations where elevated radiation levels were measured during the walkover survey;
- down-hole measurement of radiation levels within the completed soil borings; and
- analysis of one soil sample using high-resolution gamma spectroscopy to identify and measure radiation levels.

The results of the surface survey demonstrated radiation levels above normal background. The down hole measurements were elevated above levels usually attributable to background concentrations of naturally occurring radioactive materials

- the previous use of a portion of the Site as a filling station.

The Site is located near the Lindsay Light II Superfund Site where soils containing radioactive thorium have been previously reported. The presence of soils containing elevated levels of radioactive thorium on the Property was confirmed during an investigation completed by CRA in February 2001. Subsequently, CRA conducted the reported Subsurface Investigation at the Site in April 2001 to evaluate the Property from the perspective of assessing subsurface radiation relative to naturally occurring background radiation levels in local unimpaired soils and to evaluate the potential volume of soil containing elevated radiation levels. The results of the April 2001 investigation confirmed the presence of radioactive materials in the soil in at least two areas along the western portion of the Site at levels above the cleanup level established by the U.S. EPA for the Lindsay Light Site (7.1 pCi/g total radium).

Significant amounts of fill material are known to have been added historically to raise the grade of city streets above the original natural marshy ground. It is probable that the Site is underlain by fill material dating from the 19th century. Also, the Site is located in an area that was destroyed during the Great Chicago Fire of 1871. Varying amounts of rubble consisting of brick fragments, concrete, and minor amounts of slag, coal, glass, and wood were identified in soil borings advanced at the Site during the limited Subsurface Investigation conducted by CRA in April 2001. Moreover, and as discussed previously, the fill contains radioactive materials with total radium activity in excess of U.S. EPA's clean up standard established for the Lindsay Light Site of 7.1 pCi/g (total radium).

Other environmental conditions, summarized previously, are related to petroleum hydrocarbon usage on, and adjacent to, the Site. It is noted that closure approval for the former petroleum storage facilities has been obtained from IEPA.

(NORM). The gamma spectroscopy results showed concentrations of radium-226 and radium-228 surrogates in excess of the U.S. EPA's local action level of 7.1 pCi/g (total radium).

A copy of the CRA report is provided in Appendix B.

3.6 SUBSURFACE INVESTIGATION [CRA APRIL 2001]

CRA completed a limited Subsurface Investigation in April 2001 at the Site (247 East Ohio Street). The purpose of this investigation was to further evaluate subsurface radiation levels and to evaluate the potential volume of soil containing elevated concentrations of radioactive material. Investigative activities completed by CRA consisted of the following:

- installation and sampling of 59 soil borings (see Figure 3.2) at locations where elevated radiation levels were observed during the walkover survey and at subsurface areas anticipated to be disturbed by development of the Site;
- downhole measurement of radiation levels within the completed soil borings;
- analysis of 94 soil samples using high-resolution gamma spectroscopy to identify concentrations of radioactive material; and
- surveying of the completed soil boring locations

The results of this investigation confirmed the presence of radioactive materials in the soil in two areas along the western portion of the Site at levels above the cleanup level established by the U.S. EPA. The location of this area is shown on Figure 3.3, which illustrates the contoured radiation count readings from the investigation.

A copy of the CRA report is provided in Appendix C.

3.7 SUMMARY OF EXISTING SITE ENVIRONMENTAL CONDITIONS

The environmental condition of the Site is potentially affected by the past use of the Property. The primary known or suspected historic impacts are as follows:

- the presence of radioactive material associated with the historic Lindsay Light operations, located nearby;
- the presence of historic fill material; and

4.0 SOIL REMOVAL AND RESTORATION

4.1 OVERVIEW

The results of previous investigations indicate that some soil is present on Site, which exceeds the U.S. EPA local action level of 7.1 pCi/g (total radium). The estimated extent and location of the soil contamination is indicated on Figure 3.3. Based on borehole data the depth of historic fill material on site is estimated to range from approximately 7 to 12 feet and averages approximately 9.2 feet.

The remediation activities will be focused on the removal and off-Site transportation and disposal of radiologically-contaminated soil/fill material. It is expected that the excavation and screening of soils will extend through the complete thickness of the fill material over the entire Site area, down to the depth where underlying native materials are encountered, estimated at approximately 9.2 feet below grade.

The excavation may also extend into the underlying native material depending on the results of verification testing to be performed. As described previously, the underlying native soils comprise a mixture of fine to medium grained sand and small amounts of gravel. It is not expected that groundwater will be encountered within the depth of the excavation.

Soil exceeding the U.S. EPA local action level of 7.1 pCi/g, as determined by field screening, will be placed in flexible Lift-Liner™ containers to be removed from the Site for transportation and disposed of at the Energy Solutions disposal facility in Clive, Utah (Envirocare of Utah, Inc.). Subsequent soil confirmatory testing of the base of excavated areas where underlying native soil is encountered will be undertaken in order to verify completion of removal. Following this, the Site will be restored to a condition suitable for the subsequent development phase. A qualified remedial contractor, selected through a contractor procurement process, will undertake the work.

The general sequence of activities will include the following:

Preliminary Phase

- preparatory work, including obtaining required permits and approvals, utility clearances, lane closures and other traffic controls (if required); and
- selection of contractors and subcontractors.
- borehole investigation along the southern portion of the west property line to accommodate future ground retention system

- mobilization of materials, equipment, and temporary support facilities, and Site security implementation including fencing and barriers for noise/dust suppression;
- Site surveying, clearing of certain existing structures, and fence removal;
- removal of asphalt, and walkover survey for presence of contaminated soil/fill;
- staging of equipment for controlled excavation;
- construction of ground retention system;
- excavation, identification, and removal of contaminated soil/fill to required depth in designated contaminated areas;
- confirmatory soil sampling and analysis for above;
- backfilling and Site restoration;

For purposes of the excavation program, the Site may be divided into multiple work areas suitable for efficient sequencing of activities. The number and layout of the areas will be determined based on the logistics of simultaneous excavation and management of stockpiled material, maintenance of temporary facilities, Site development activities, etc. This is subject to further evaluation and discussion with the selected remedial contractor. It is expected that two areas, where elevated radiation levels have been identified from previous investigations, as shown on Figure 4.1, will be excavated first and the remaining soil will be excavated following this initial removal. During excavation activities in a given area, the remaining areas may be used for support/staging purposes. All contaminated soil transport containers will be staged for filling within the controlled boundaries of the Site.

The activities outlined above are discussed in further detail herein and in the supporting Appendices to this RA Work Plan, including the Construction Quality Assurance Plan (CQAP), Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP), and Health and Safety Plan (HASP).

4.2 ORGANIZATIONAL STRUCTURE AND SITE MANAGEMENT

CRA will provide the overall management of the project. Independent subcontractor support will be utilized for specific tasks and activities (e.g., testing and laboratory

services). As noted above, a suitably qualified remedial contractor will undertake the work. U.S. EPA will provide oversight of the project.

The project organization is represented graphically on Figure 4.2. The responsibilities of the primary project personnel are outlined below.

U.S. EPA will be represented by Vernetta Simon, On-Scene Coordinator (OSC).

The primary CRA contact for this voluntary removal action is Bruce Clegg of CRA.

The CRA project manager will have overall responsibility for work plan development and implementation. The CRA project manager will be the primary point of contact between the client's project manager, the project team and the U.S. EPA OSC.

The CRA project coordinator will assist the CRA project manager and will be responsible for carrying out the daily functions associated with work plan activities and report generation. The project coordinator will be assisted by a project engineer, who will together work closely with the various team leaders and contractor representatives.

Other primary personnel include the Contractor's project manager, site superintendent, and Health and Safety Officer (HSO), CRA's Site engineer and the project Quality Assurance Officer. Subcontract support will be provided to CRA by RSSI of Morton Grove, Illinois.

4.3 PERMITS

Permits and/or approvals will be obtained as required for undertaking the removal action work and associated activities. Procedures for development and completion of permit applications will be discussed with individual issuing authorities during the preparation stages of the RA.

Permit and approval requirements that may be necessary include:

- demolition permit;
- excavation permit;
- street/sidewalk closure permit;
- consultation with utility authorities and companies;
- consultation with City of Chicago Department of Environment; and

- consultation with City of Chicago Department of Transportation.

4.4 UTILITY LOCATION AND CLEARANCE

Utility location maps will be obtained and compiled during the preparation stages of the RA. This will include natural gas, water, sewer, telephone/telecommunication, cable television and electrical power. This information will be obtained from utility companies or the respective designated utility location service, e.g., Chicago Utility Alert Network (also known as "DICGER").

The utility information will be reviewed with respect to Site conditions (i.e., presence of gas meters, manholes, catch basins, water valves, protruding conduits, power poles, etc.). This information will be used to assist in final planning for sheeting and shoring placement, excavation and related activities.

Prior to any intrusive work, requests will be made to the relevant authorities to mark utility locations in the field. Measures will be taken to protect any utilities that potentially conflict with the excavation activities.

4.5 MOBILIZATION

Mobilization of equipment and materials to the Site will be undertaken in stages, corresponding to the work activity being undertaken. Initial mobilization will include temporary facilities and control measures (e.g., temporary fencing, barriers, and personal hygiene and decontamination facilities).

Additional equipment will be mobilized as necessary for the removal of asphalt pavement material.

Upon completion of the soil excavation task, equipment will be mobilized for backfilling operations, as appropriate for the subsequent work.

Concurrent with the general sequence of tasks outlined herein, pieces of equipment that are not needed will be demobilized from the Site on an ongoing basis, following decontamination as required.

4.6 SITE SURVEYING, CLEARING, AND FENCE REMOVAL

Prior to commencement of Site clearing, a survey will be completed. This will include:

- layout of utility locations and site boundaries;
- establishment of control points for Site grid layout;
- location of existing surface features, such as existing buildings, structures, fencing, etc.; and
- photographic record of pre-construction conditions.

The Site survey will be documented in the form of a Site drawing (CAD file format) and digital photograph file (electronic format).

Site clearing may involve demolition and removal of existing structures and fencing. All above ground materials from demolition removal will be taken from the Site and, following screening, either recycled, resold, or disposed as either demolition waste or non-hazardous waste.

4.7 ASPHALT PAVEMENT REMOVAL AND WALKOVER SURVEY

4.7.1 ASPHALT PAVEMENT REMOVAL

Asphalt pavement will be removed from the Site in stages, according to plans to be developed with the selected remedial contractor. Generally, it is expected that asphalt pavement removal, and subsequent excavation activities, will be undertaken for the two areas where elevated radiation levels have been identified from previous investigations first. Excavation work in the remaining areas will follow this initial removal. Areas that are excavated subsequently will then become available to receive clean fill material from within the Site as backfill if required with respect to the subsequent excavation.

The removed asphalt material will be field-screened to determine radiation levels at the point of excavation. Material that exhibits elevated readings that exceeds U.S. EPA's local clean-up level of 7.1 pCi/g (total radium) will be placed in a flexible Lift-LinersTM for off-Site transportation and disposal (along with the radiologically-contaminated soil) to Envirocare. All remaining asphalt material will be loaded directly into suitable containers (e.g., roll off boxes) for subsequent removal to an off-Site recycling or disposal facility.

4.7.2 WALKOVER SURVEY

Following removal of the asphalt pavement material in each work area, a walkover survey will be conducted to determine radiation levels at the exposed surface. The purpose of the survey is to identify potentially contaminated material for subsequent excavation.

For purposes of the survey, grid lines will be established at a 5-meter spacing. The locations will be established with ground layout survey techniques and marked with stakes/flagging and paint. Gamma count values will be recorded at each node (i.e., at 5-m intervals) and within each grid. The maximum value also will be recorded within each grid. The methodology for the field-screening is provided in the FSP and QAPP.

4.8 SOIL EXCAVATION AND STAGING

4.8.1 GENERAL

Through review of the existing buildings and structures surrounding the Site, it has been determined that installation of a ground retention system will be necessary to protect the buildings/structures (namely, the Grand Ohio building along the western property line) and the adjacent streets and sidewalks during excavation of contaminated soils to the designed depth. The ground retention system is further discussed below.

4.8.2 SHEETING/SHORING (GROUND RETENTION SYSTEM)

It has been established through evaluation of the Site and surrounding building structures that development of ground retention systems will be necessary to complete the removal of contaminated soil/fill at the Site.

The primary ground retention system will consist of an "angle of repose" (also called "side-sloping") shoring approach around the entire Site perimeter. The vertical sides of this retention system will abut the Site within the sidewalks on the north, east, and southern property lines. Here, sloping will be advanced downwards into the Site to a depth where native sands are encountered. In order to avoid building footings associated with the parking structure immediately to the west of the Site, the angle of repose in this particular area will start at approximately 10 feet, or so, east of the western property line, at which point sloping down into the Site will commence. The primary ground

retention system is shown on Hayward-Baker's Excavation Plan (Sheet Reference Number EX-1). To help determine the presence or absence of radioactive material above U.S.EPA's 7.1 pCi/g cleanup objective in this quadrilateral angle of repose area, a supplemental down-hole radiological investigation will be conducted at 1 meter centers. Figure A identifies the comprehensive investigation area in the southwest corner of the Site and Figure B identifies the investigative boreholes proposed for the southwest comprehensive investigation area. To the extent that any material above 7.1 pCi/gm is encountered through this investigation, it will be removed by augering with large diameter (possibly 3 foot) augers. Any contaminated soil removed in this manner will be replaced with lean concrete grout. Once final design parameters are evaluated for the angle of repose, further retention methods e.g. sheeting, shoring, trench boxes, open slot cutting, etc. may be utilized to augment the angle of repose system contemplated herein.

4.8.3 EXCAVATION ZONES AND SEQUENCING

As stated previously, it is expected that the Site will be divided into multiple areas, with the two areas, where elevated radiation levels were identified from previous investigations, being excavated first. In addition, to the extent that the supplemental down-hole investigation in the southwest corner of the Site indicates that contaminated material exists in the area adjacent to the western property line that exceeds 7.1 pCi/gm, this material will likely be removed via augering with large (i.e. 3 foot) diameter augers. Any contaminated soil removed in this manner will be replaced with lean concrete grout. The remaining area will be excavated until the entire site has been excavated down to native materials. The general sequence of activities at each area will be essentially the same. Asphalt or concrete pavement will be removed, followed by the walkover survey followed by excavation and backfilling.

Material that appears to exceed 7.1 pCi/g (total radium), on the basis of field-screening results² during the walkover survey, will be excavated in lifts not exceeding 18 inches and placed directly into flexible Lift-LinersSM for off-Site transportation to Energy Solutions for disposal. Following removal of the first lift, the exposed surface will be re-surveyed, using the same techniques as the initial walkover survey. The process will be repeated for each lift. This process will continue downward until native material or groundwater is reached, whichever occurs first. If native material is encountered before reaching groundwater, field screening will be performed to determine if further excavation into native material is required. Excavation below the water table will not be

² The comparison to 7.1 pCi/g (total radium) will be based on gamma rate counts using a direct reading instrument. The calibration will be conducted at the Kerr-McGee Rare Earths Facility in West Chicago, Illinois. The protocol is provided in Appendix F.

undertaken. When the excavation is complete, based on field screening, U.S. EPA will be notified and U.S. EPA will perform verification sampling.

If Tronox LLC, the party obligated by contract to Respondent to fund and oversee the transportation and disposal of thorium-contaminated soil from the Site, files for bankruptcy protection under the laws of the United States of America and is ordered by the bankruptcy court to discontinue the transportation and disposal of thorium-contaminated soil from the Site, or if Tronox LLC (including its representatives, contractors or agents) interferes, delays, stops or otherwise acts or fails to act in such fashion, the result of which causes Respondent to retain at the Site for more than a forty-eight (48) hour period, in excess of 17 cubic yards of excavated thorium-contaminated materials, then Respondent may suspend further excavation Work at the Site.

Respondent shall immediately notify U.S. EPA by electronic mail and telephone if it elects to suspend Work at the Site. If Respondent suspends the Work, then in accordance with the ASAOC and this Work Plan, Respondent will manage, transport and dispose of any thorium-contaminated materials that were excavated prior to the suspension of Work. Respondent will place a visible barrier between any unexamined or unremediated area and the clean fill used to return the Site to grade. Respondent will also reapply asphalt or similar cover across the Site to prevent exposure to any known or suspected thorium-contaminated materials. Within 45 days of the suspension of Work, Respondent shall submit a detailed diagram(s) depicting the lateral and vertical extent of areas uninvestigated or unremediated, the surface gamma readings of the base and walls of the excavation prior to filling, and any fully investigated and remediated areas at the Site.

After suspending the Work, Respondent shall notify U.S. EPA at least 72 hours prior to any work at the Site that intrudes into or exposes subsurface soils or materials. Within 270 days of notice to U.S. EPA that the Respondent will suspend Work at the Site or within 10 days prior to the conveyance of any ownership in the property, whichever comes first, Respondent shall establish institutional controls at the Site in the manner described in Paragraph 26 of the ASAOC as if Respondent had completed Work at the Site.

4.8.4 STAGING OF NON-IMPACTED EXCAVATED MATERIAL

Generally, the excavation activity within each area may yield one stockpile of non-impacted material, based on field screening results. The non-impacted material may be further segregated during excavation, to separate materials that are not suitable

for use as backfill (if required for the subsequent development phase), based on engineering properties. The stockpiled material will be placed on polyethylene sheeting to protect underlying surfaces, as needed. The stockpile will be covered with polyethylene sheeting during non-working hours and periods of inclement weather, to protect against wind and rain. Radiologically-contaminated material, as discussed further in Appendix E, will be directly loaded into flexible Lift-LinersSM and staged for off-Site transportation and disposal.

4.8.5 TESTING AND DISPOSAL OF NON-IMPACTED EXCAVATED MATERIALS

Testing of non-impacted, stockpiled soil for off-Site transportation, reuse, or disposal will be done in accordance with recognized industry practices for excavation spoils. Generally the non-impacted excavated material will be sampled and analyzed by high resolution gamma spectroscopy to determine the concentration of total radium relative to the U.S. EPA's local cleanup objective of 7.1 pCi/g (total radium). For material that is unsuitable for use as backfill based on engineering properties, or otherwise will not be used as backfill and requires off-site disposal, additional testing parameters, if necessary, will be based on the requirements of the designated disposal facility.

4.8.6 DUST SUPPRESSION

Appropriate dust suppression measures will be employed through the duration of the excavation, staging, and backfilling (if required) activities. Potential dust generation in open excavation areas will be controlled through the use of appropriate dust suppressants (e.g. water). Stockpiles of excavated material also will be subject to application of dust suppressants as the stockpiles are being developed. In addition, the stockpiles will be covered with polyethylene sheeting material as described earlier, during non-working hours and periods of inclement weather.

4.8.7 VEHICLE DECONTAMINATION

Vehicles that enter the Site and come in contact with potentially contaminated soil/fill material will be surveyed and decontaminated, as necessary, prior to leaving the Site. Procedures for surveillance are presented in Appendix G. Washwaters from the decontamination pad will be collected for disposal in accordance with the requirements

of the Metropolitan Water Reclamation District of Greater Chicago or used for dust suppression purposes.

4.8.8 MONITORING

Monitoring will be conducted during intrusive activities to ensure adequate protection of Site workers and the general public. This will include on-Site air monitoring, dosimetry testing, and perimeter air monitoring. Procedures for these monitoring activities are included in the HASP (see Appendix G).

4.9 CONFIRMATORY SAMPLING AND ANALYSIS

4.9.1 OVERVIEW

Sampling and analysis of soil/fill material will be undertaken to determine disposal requirements and post-excavation conditions. In addition, field screening will be performed to identify areas of potential contamination that require segregation. The various types of testing to be performed are summarized below:

- field screening (asphalt or concrete pavement material);
- down-hole investigation in the southwest corner of the Site adjacent to the western property line
- field screening (walkover survey and surface of each exposed lift);
- monitoring of any Site soil retained to accommodate the angle of repose (at FDA's discretion);
- stockpile sampling; and
- base of excavation sampling.

Field screening techniques were discussed in previous sections and are described in the FSP and QAPP. Laboratory analysis of samples collected from the base of excavation is described further below.

representative, or by direct shipment of the verification sample to USEPA's radioanalytical laboratory;

- after a 28-day holding time, USEPA's radioanalytical laboratory will analyze the verification sample by HPGe gamma spectroscopy for an assessment of the radium-226 and radium-228 concentrations; and
- the USEPA total radium result will be the final determinant for successful attainment of the 7.1 pCi/g cleanup goal (i.e., the average of the radium-226 and radium-228 concentrations does not exceed 7.1 pCi/g).

4.10 BACKFILLING AND RESTORATION OF EXCAVATED AREAS

4.10.1 OVERVIEW

Excavated areas that need to be backfilled following excavation will be backfilled with either appropriate (from a geotechnical or engineering standpoint) on-Site material that has been designated as non-impacted as a result of field screening efforts or imported clean backfill material as outlined in Section 4.10.2 below. Backfilling operations will be carried out such that adequately-sized heavy vibration equipment is used to compact the material. The backfill will be placed in loose lifts not exceeding 1 foot in thickness and will be compacted to a suitable standard for the intended site use. An engineer or technician will observe backfilling operations, and compaction testing, if necessary, may be performed to document the placement and compaction results.

It is anticipated that the two contaminated areas excavated in the first phase will be backfilled and restored to support vehicle traffic pending the initiation of the subsequent excavation. All backfilling will be completed to the extent required under the Site development plan.

4.10.2 IMPORTED BACKFILL SOURCE VERIFICATION

Imported backfill material will be accepted from known sources and will be subject to inspection by CRA at the point of origin. In addition, testing of backfill material will be undertaken, if deemed necessary based on an assessment of the previous use of the site of origin. All outside backfill sources will be inspected and tested in accordance with a Standard Operating Procedure CRA has developed to ensure use of "clean" imported material to be used as fill on-Site. No imported backfill will be used on Site that exceeds

4.9.2 U.S. EPA VERIFICATION SAMPLING

All verification samples will be provided to U.S. EPA for independent testing and analysis. U.S. EPA will implement the following procedure:

- conduct a gamma survey of the excavation area (each 100 square meter grid) to determine if the hotspot remains;
- collect a total of 5 soil samples from the top 15 centimeters of the surface soil. These soil samples will be collected with one at the center of the verification unit, and each of the other four at roughly half way between the center and each corner of the verification unit;
- screen the 5 soil samples through ¼ inch hardware cloth screen to produce screened soil;
- gamma survey the debris not passing through the ¼ inch in the screen for excess gamma count rates;
- composite the screened soil;
- fill five 20-milliliter bottles (or HPGe sample container as appropriate) with screened composited soil to produce the verification sample requiring analysis;
- transfer the verification sample to the contractor or a representative of the contractor's radioanalytical laboratory for analysis who then will analyze the sample(s) and provide a report to USEPA that includes the following:
 - a) the system's reporting data indicating the results if the analysis (i.e., the printouts from either the NUTRANL system for the HPGe system's spectroscopy software used for the verification sample analysis),
 - b) in the case of NUTRANL analysis, the system's reporting data for each of the five individual 20-milliliter bottles, along with a computation of the average concentration of the five 20-milliliter bottles combined, with a comparison of that average to the 7.1 pCi/g criterion (i.e., the average of the radium-226 and radium-228 concentrations does not exceed 7.1 pCi/g), and
 - c) in the case of HPGe analysis, the laboratory's interpretation of the system's reporting data, comparing its results to the 7.1 pCi/g criteria (i.e., the average of the radium-226 and radium-228 concentrations does not exceed 7.1 pCi/g), and stating which radioanalytes were selected for this assessment.
- after the contractor's laboratory completes analysis and provides its report to USEPA, USEPA will receive the verification sample from the contractor, either by transfer of the verification sample to the USEPA Region 5 OSC or their

3.7 pCi/g total radium (Ra-226 + Ra-228). Decisions regarding testing of imported backfill material will be subject to the concurrence of U.S. EPA.

4.11 TRAFFIC MANAGEMENT

During the removal program, the movement of vehicles to and from the Site will be managed, such that vehicles travel on pre-defined routes. These routes will be selected in consideration of factors such as ease of travel and adequacy to support loads. In addition vehicle movement will be scheduled to limit truck traffic to non-rush hour time (i.e., not 0730-0900 and 1630-1800), if possible.

5.0 PROJECT REPORTING AND COMMUNICATIONS

5.1 OVERVIEW

Project reporting will include the completion of weekly and monthly status reports during the progress of the work, and a final report at the completion of the remediation activities.

5.2 WEEKLY REPORTS

Weekly reports will be completed by Site personnel to document the progress of the work activities, and will include the following, in summary format:

- activities undertaken each day;
- walkover survey results;
- description of depths and limits of excavation, and pertinent observations;
- description of material handling and stockpiling;
- sample collection details;
- disposal information;
- air monitoring information; and
- other relevant comments and details.

These reports will be completed in a standard format and will be retained in the Site project file.

5.3 MONTHLY REPORTS

Monthly reports will be completed by the CRA project manager/project engineer. The monthly reports will include a written summary of the work performed. The monthly reports will include:

- weekly report information;
- summary of monitoring/testing results;
- summary of relevant correspondence and discussions;
- identification of issues to be resolved; and

6.0 WORK PLAN APPROVAL CONDITIONS

6.1 OVERVIEW

U.S. EPA has been provided with ultimate Property development information including building and landscape renderings as described in both documents and oral discussions with U.S. EPA representatives during a meeting held on November 19th, 2002. Consequently, U.S. EPA is aware that the Property is slated for development as a mixed-use residential and commercial high-rise building. In order for the development of the Property to proceed as planned, certain understandings, conditions, and protections must be met (or established) to satisfy potential investors and lenders, as well as to establish a minimum "comfort level" necessary to proceed with Property development activities.

6.2 WRITTEN APPROVAL

U.S. EPA will, in a timely fashion, send CRA a letter giving U.S. EPA's approval of the Work Plan, including any conditions upon which said approval is based, after its review and negotiation of same with CRA. The removal activities under this Work Plan shall not commence until such approval from U.S. EPA is received.

6.3 ULTIMATE PROPERTY USE CONFIRMATION

Performance of the removal work in accordance with this Work Plan will reduce or eliminate any risk associated with the radioactive contamination that would otherwise prevent mixed residential/commercial use development. Upon completion of removal actions in accordance with the previous sentence, U.S. EPA will issue a "completion of work" letter for the Property.

6.4 PUBLIC AND ENVIRONMENTAL BENEFIT CONFIRMATION

Performance of the removal work in accordance with the Work Plan will reduce or eliminate any risk associated with the radioactive contamination thereby providing significant public and environmental benefits.

- discussion of progress of work toward completion.

The monthly reports will be prepared by CRA and distributed to the U.S. EPA, the client, and the remedial contractor.

5.4 FINAL PROJECT CONSTRUCTION REPORT

At the completion of the remediation activities, a final report will be completed. The final report will provide a description of the activities undertaken and will summarize all relevant technical information, including closure verification sample testing results and disposal information. The report will serve as a record of the work completed and will be distributed to the client and U.S. EPA.

6.5 COMPLIANCE WITH LAWS

The work contemplated herein complies with all applicable laws, guidance documents, etc., administered by U.S. EPA.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3990

DEC 01 2000

MAIL TO THE ATTENTION OF
SE-52VIA FACSIMILE (312) 345-9140
AND U.S. MAIL

Mr. Alfred D'Ancona
D'Ancona and Company
111 West Jackson Street, Suite 1044
Chicago, Illinois 60604

RE: Walkover Survey of Parking Lot at 245 East Ohio, Chicago,
Illinois

Dear Mr. D'Ancona:

On September 28-29, 2000, U.S. EPA conducted a radiation walkover survey of your parking lot at 245 East Ohio to determine whether there were any elevated radiation readings at the surface that might indicate the presence of subsurface radioactive materials. There were elevated readings in three locations. One of these is distinctly elevated from background levels and is towards the west side of the lot, in the parking spaces near the building wall. The other two seem to be small and are near the south-center of the lot and on the southeast corner of the lot, along the barricade.

Our procedure for conducting the walkover survey was to first walk, with the probe about 6 inches off the ground, the entire area along parallel lines about 3 - 4 feet apart, assessing background levels by looking at the lowest readings and looking for spots and regions of elevated radiation levels. We then took, for the record, 30 second counts, on contact with the ground, at regular intervals (in the center of each parking space and down the centerline of the driveway) to quantify the exposure environment. We also took readings at selected spots where initial readings were distinct from background levels. Furthermore, we took exposure rate measurements around the hot dog restaurant and in the attendant's booth.

Readings ranged from 1,495 counts per 30 seconds to 4,115 counts per 30 seconds. Spots along the west side reached as high as 16,061 counts per 30 seconds. All readings were on contact. Exposure rate measurements ranged from 3 to 6 micro-Röntgen per hour.

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This survey indicates that radioactive material is present under the asphalt in one area definitely and two other areas possibly. The levels around the hot dog restaurant and in the attendant's booth are levels we consider normal background. None of these areas pose an immediate health hazard but the risk for contamination of people and equipment would rise appreciably if the asphalt were removed. Shielding by the asphalt and any fill will reduce count rates and emissions from any underlying radioactive material could be difficult or impossible to detect. Moreover, removing the asphalt covering and spreading the soil over a larger area of the parking lot or to other locations could greatly expand the area of concern.

If you decide to remove the asphalt, contact us prior to its removal so that we may observe your radiation surveillance and sampling for Radionuclide identification and quantification or take our own measurements and sampling. Radiation surveillance should be conducted under a health and safety plan with disposal of any radioactive materials at a regulated disposal facility.

To help us better understand the conditions on this property, we would appreciate being furnished a copy of the environmental report prepared by Schrack Environmental.

Specific detection equipment used during this survey were a probe called a Bicon FIDLER Model GS (S/N B088D), Ludlum Model 19 (S/N 65598), and the Ludlum Model 2121 survey meter (S/N 13148). These meters were calibrated on February 2, 2000, and February 3, 2000, respectively.

If you would like to discuss this matter further, please contact us at (312) 886-3601, or Fred Mickle, On-Scene Coordinator, at (312) 886-5131, or Larry Jensen, Health Physicist, at (312) 886-5656. Please direct any legal questions to Mary Pulghum, Associate Regional Counsel, at (312) 886-4682.

Sincerely,

Vereta Simon
Vereta Simon
On-Scene Coordinator

cc: Karen Pressed, City of Chicago - Department of Environment

APPENDIX A

U.S. EPA LETTER DATED DECEMBER 1, 2000

1-64-0770-0

CONESTOGA-ROVERS
& ASSOCIATES

December 4, 2002

VIA
OVERNIGHT COURIER

Mr. Fred Mickle
U.S. Environmental Protection Agency
Superfund Division Region 5
Emergency Response Branch
77 West Jackson Boulevard - SE-5J
Chicago, Illinois 60604

Dear Mr. Mickle:

Re: Property Investigation
Real Property Located at Fairbanks & Ohio
Chicago, Illinois

On behalf of Draper & Kramer, the prospective purchaser and the current property owner, Conestoga-Rovers & Associates (CRA) completed a limited Property investigation at the property located at 245 East Ohio in Chicago, Illinois (Property). The purpose of the Property investigation was to evaluate the Property from the perspective of assessing subsurface radiation relative to naturally occurring background radiation levels in local unimpacted soils. The most likely source of levels in excess of background could be due to the presence of thorium. The Property is located near the Lindsay Light Superfund Site and Landay Light II Site where soils containing levels of radioactive thorium have been reported. The primary objective of the limited Property investigation was to determine if soils beneath the Property contained concentrations of radioactive thorium above clean-up levels established by the United States Environmental Protection Agency (USEPA) for the neighboring Sites.

The Property is currently an active pay parking lot located in the Streeterville area of Downtown Chicago. The Property is bounded by East Ohio Street to the north, Fairbanks Court to the east, East Grand Avenue to the south and a high-rise condominium building to the west.

In brief, CRA's investigation confirmed the presence of radioactive thorium in the soil in at least one location beneath the Property at levels above the clean-up level established by the USEPA for the neighboring sites. The following discussion summarizes the activities completed during the investigation and presents the data obtained.

Work Scope

Field activities associated with the limited Property investigation were conducted on February 9, 2001. Investigative activities completed consisted of the following:

8015 W Bryn Mawr Avenue, Chicago, Illinois 60631-3801
Telephone: 773-380-9033 Facsimile: 773-380-6421
www.CRAinvest.com

Reference No. 017770

APPENDIX B

CRA REPORT OF PROPERTY INVESTIGATION (FEBRUARY 2001)

CONESTOGA-ROVERS
& ASSOCIATES

December 4, 2002

- 2 -

Reference No. 017770

- completion of a surficial walkover survey of the Property;
- installation and sampling of four soil borings at locations where elevated radiation levels were measured during the walk over survey;
- down-hole measurement of radiation levels within the completed soil borings; and
- analysis of one soil sample using high-resolution gamma spectroscopy to identify and measure radiation levels.

RSSJ of Morton Grove, Illinois was retained by CRA to provide radiation measurements during the Property investigation. Mid-American Drilling Services Inc. of Elburn, Illinois was retained by CRA to provide drilling services.

Walkover Survey

The walkover radiation survey was conducted early in the morning when the parking lot was nearly empty. The survey was conducted using a thallium-doped sodium iodide detector connected to a Ludlum Model 193 radiation meter. This meter is designed to detect low level gamma energies emitted from thorium or thorium-like elements. During the survey, the probe of the meter was positioned within inches of the asphalt surface with the detector directed downwards towards the ground. The meter, as used, is capable of generally measuring radiation levels from the surface to a maximum depth of two to three feet below grade depending on subsurface soil conditions.

An approximate nine-foot grid pattern was established across the Property. The walkover survey consisted of walking the grid pattern along the north and south orientation across the Property and measuring and recording the meter reading at each grid intersection. Additional measurements were taken between the grid intersections. A general background radiation level of 2,000 counts per minute (cpm) was measured across the Property.

Results from the walkover survey are summarized on Table 1. Radiation levels across the Property ranged from 2,000 to 8,500 cpm. An initial review of the data, identified nine areas of the Property which indicated areas of potential radiation anomalies. These areas were generally located at the grid intersections identified as Q10, D13, J12, D13, D12, C9, B3, G8, and O7. Figure 1 presents a contour map of the radiation measurements recorded during the walkover survey. This figure graphically illustrates radiation intensities immediately above the asphalt cover across the Property.

Soil Borings

A total of four soil borings (SB-B3, SB-BG, SB-Q10, and SB-D131/2) were advanced to measure radiation levels along the vertical profile of the open borehole. Soil boring maximum depths

CRA-017770-02

2001-02-09 10:00:00 AM

Worldwide Engineering, Environmental, Construction, and IT Services

Worldwide Engineering, Environmental, Construction, and IT Services



-3-

Reference No. 017770

Marineide Business, Environmental Construction and IT Services



44

Reference No. 017770

Conclusions

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Bruce Clegg

BC5/1g/1

Attachments

c Mary Fulgham - United States Environmental Protection Agency (USEPA)
Mike Ohm, Bell, Boyd & Lloyd
Carl Peterson, Draper & Kramer
Thomas Carey, Bell, Boyd & Lloyd
Wilson P-Funkhouser, Funkhouser Vegosen Liebman & Dunn Ltd.
Walter Pochron. CRA



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	52
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BLD = Building
Readings of 6540 open five feet to the north
Readings in course just minute (open)
Background approximately 2,000 cpm

STRATIGRAPHIC AND INSTRUMENT ON LOG
(OVERBURDEN)

PROJECT NAME: FAIRBANKS S OHIO
 PROJECT NUMBER: #7770
 CLIENT: FAIRBANKS S OHIO
 LOCATION: CHICAGO, ILLINOIS
 DRILLING CONTRACTOR: MID AMERICA DRILLING

HOLE DESCRIPTION: SB-83
 DATE COMPLETED: FEBRUARY 8, 2001
 DRILLING METHOD: 4 1/4" HSA
 CRA SUPERVISOR: W POCHON
 DRILLER:

DEPTH ft. BOS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV ft. AMSL	MONITOR INSTALLATION	SAMPLE		PI log
				NUMBER	STATE	
	Asphalt & Gravel					
	Fb Sand & Gravel, black, moist					
-2.5	CL-CLAY, some sand, silty gravel, trace of bricks, dark brown, moist, w/ (LL)					
	- brick fragments					
-5.0	SP-SAND, some clay, silty gravel and brick fragments, dark brown to gray, wet, w/ (LL)					
	SP-SAND, fine to medium grained, silty gravel, brown, moist					
-7.5						
	END OF HOLE & HOLE LOGS					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE, REFER TO CURRENT ELEVATION TABLE
 WATER FOUND 1 STATIC WATER LEVEL 3

STRATIGRAPHIC AND INSTRUMENT MONITORING LOG (OVERBURDEN)						(CL-03) Page 1 of 1
PROJECT NAME: FAIRBANKS & OHIO		HOLE DESIGNATION: SB-08		DATE COMPLETED: FEBRUARY 9, 2001		
PROJECT NUMBER: 1770		CLIENT: FAIRBANKS & OHIO		DRILLING METHOD: 4 1/4" HSA		
LOCATION: CHICAGO, ILLINOIS		CRA SUPERVISOR: M. POCHRON		DRILLER:		
DRILLING CONTRACTOR: MID AMERICA DRILLING						
DEPTH FT. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. FT. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	STATE VALUE	PID (ppm)
	Asphalt & Gravel		ASPHALT PATCH			
-2.5	SP-SAND, little gravel, trace of silt and bricks. (dark brown, dry, (FILL))					
-5.0	- little clay, dark brown					
-7.5	- bricks and rubble					
	SP-SAND, medium to fine grained, gray, moist					
	END OF HOLE # 1011 BGS					
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE WATER FOUND @ STATIC WATER LEVEL @						

STRATIGRAPHIC AND INSTRUMENT MONITORING LOG (OVERBURDEN)						(CL-03) Page 1 of 1
PROJECT NAME: FAIRBANKS & OHIO		HOLE DESIGNATION: SB-D-13 1/2		DATE COMPLETED: FEBRUARY 9, 2001		
PROJECT NUMBER: 1770		CLIENT: FAIRBANKS & OHIO		DRILLING METHOD: 4 1/4" HSA		
LOCATION: CHICAGO, ILLINOIS		CRA SUPERVISOR: M. POCHRON		DRILLER:		
DRILLING CONTRACTOR: MID AMERICA DRILLING						
DEPTH FT. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. FT. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	STATE VALUE	PID (ppm)
	Asphalt & Gravel		ASPHALT PATCH			
-2.5	Gravel & Plastic P.I.L.					
	SP-SAND, little clay, gravel, bricks, fragments, (dark brown, (FILL))					
-5.0	SP-SAND, light to medium gray, fine grained, (dark brown, (FILL))					
-7.5	END OF HOLE # 1011 BGS					
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE WATER FOUND @ STATIC WATER LEVEL @ CHEMICAL ANALYSIS @						

STRATIGRAPHIC AND INSTRUMENT MONITORING LOG (OVERBURDEN)						(CL-04) Page 1 of 1
PROJECT NAME: FAIRBANKS & OHIO		HOLE DESIGNATION: SB-Q10		DATE COMPLETED: FEBRUARY 9, 2001		
PROJECT NUMBER: 1770		CLIENT: FAIRBANKS & OHIO		DRILLING METHOD: 4 1/4" HSA		
LOCATION: CHICAGO, ILLINOIS		CRA SUPERVISOR: M. POCHRON		DRILLER:		
DRILLING CONTRACTOR: MID AMERICA DRILLING						
DEPTH FT. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. FT. AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	STATE VALUE	PID (ppm)
	Asphalt & Gravel		ASPHALT PATCH			
-2.5	SP-SAND, little gravel, brick fragments, trace of clay, gray, dry, (FILL)					
	- rubble					
-5.0	SP-SAND, little clay, gravel, brick fragments, (dark brown, moist, (FILL))					
-7.5	- rubble (1 foot)					
	SP-SAND, fine to medium grained, light gray, moist					
	END OF HOLE # 1011 BGS					
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE WATER FOUND @ STATIC WATER LEVEL @ CHEMICAL ANALYSIS @						

REPORT OF SURVEY ACTIVITIES
PERFORMED AT 247 E. OHIO STREET
CHICAGO, ILLINOIS

PERFORMED FOR

CONESTOGA-ROVERS & ASSOCIATES
6615 W. BRYN MAWR AVENUE
CHICAGO, IL 60631-3501

BY

RSSI
6312 W. OAKTON STREET
MORTON GROVE, ILLINOIS 60053-2723

February 19, 2001

ATTACHMENT B

RSSI REPORT

I. INTRODUCTION

During the early 20th century, radioactive material was used in industrial operations between Illinois Street and Grand Avenue east of Michigan Avenue. Use of this material led to known soil contamination in areas near the subject site. Because of concerns of possible contamination, a survey was performed at 247 E. Ohio Street in Chicago on February 9, 2001 to determine whether the site was contaminated with residual radioactive material. The US Environmental Protection Agency (EPA) has an action level of 5 pCi/g of Ra-226 and Ra-228 activity above background concentrations, which are assumed to be 2.1 pCi/g.

II. METHODOLOGY

The survey area was an asphalt-covered parking lot with three small buildings located at the edges of the lot. Above-ground radiation level measurements were performed by passing a side shielded 2 inch by 2 inch thallium doped sodium iodide (NaI(Tl)) detector over the survey area. The detector was positioned about 3 inches from the ground surface during the survey. The detector was connected to a Ludlum 150 rate meter (serial number 149080.) Measurements were recorded in the intersection of every approximate nine foot grid node. An RSSI employee took measurements and a Conestoga-Rovers & Associates (CRA) employee recorded the data.

Down hole survey measurements were performed in two locations by placing a 1-inch by 1-inch NaI(Tl) detector connected to a Ludlum 2241 scaler (serial number 116442) in boreholes, bored by a CRA contractor, at one foot intervals to an eleven foot depth.

Three soil samples were collected from one borehole for gamma spectroscopy using a high purity germanium (HPGe) detector. The borehole was located in the area where the highest surface measurement was observed. One sample was analyzed (the sample from 1 to 3 foot depths) because it was the sample least likely to be homogenized.

The background radiation level with the Iodum 131 and the 2-inch by 2-inch sodium iodide detector was 2,000 counts per minute (cpm). The survey results are shown on the attached Table 1 compiled by CRA. Several areas on the site had radiation levels significantly above background. The most elevated areas were along the western edge of the property. The highest reading was 5,500 cpm, measured between areas D13 and B11. The elevated areas were approximately 10 feet from the south sidewalk and approximately 39 feet from the brick wall.

Down hole measurements were made with the 1-inch by 1-inch detector and the Ludlum 2241 at two different locations, B3 and G8. The results of these measurements are summarized in Table 2. Borehole G8 readings could not be made at the surface and one and two foot depths because the equipment malfunctioned due to the heavy rain.

Depth	Mole B3 (cts in 1 min)	Mole G8 (cts in 1 min)
surface	1565	-
1 ft	4019	-
2 ft	4574	-
3 ft	3554	3948
4 ft	3187	3494
5 ft	2418	2523
6 ft	2070	2421
7 ft	1946	2285
8 ft	2350	1769
9 ft	1924	1692
10 ft	1513	1633
11 ft	1667	1539

Gamma spectroscopy was performed on one soil sample taken from the area with the highest surface reading. The Final Activity Report for the analysis is attached. The sample was counted for one hour and analyzed for the naturally occurring thorium, uranium, and actinium series and potassium-40. Actinium-228 is used as a surrogate for Radium-226 in the Thorium series. Lead-214 is used as a surrogate for Radium-226 in the Uranium series. Concentrations of Ac-228 and Pb-214 are equal or approaching the concentrations of Radium-226 and Radium-226 in the soil.

Table 3 Gamma Spectroscopy Results

Sample Location (RST ID Number)	Ac-228 (pCi/g)	Pb-214 (pCi/g)	Total (pCi/g)
513 (010359)	433	152	585

The results of the surface survey show evidence of concentrations of radioactivity above normal background levels at a number of locations. The down hole measurements were elevated above levels usually attributed to naturally occurring radioactive material or rubble in the soil. Moreover, the gamma spectroscopy results show concentrations of radium-226 and radium-228 surrogates in excess of the EPA's action level of 7.1 pCi/g.

```
=====
NIST High Resolution Gamma Spectroscopy Analysis
=====
Quantum Technology
QDR_C Version 4.0
=====
Example ID : D-13 0103a
```

Sample ID : D-13 010255

```

Sample Size . . . . . 5.93e+002 g Spectrum File . . h:\pcsmpro\010355.spc
Sampling Start . . . . . 00-00-00 00:00 Counting Start . . . . . 00-00-00 00:00
Sampling Stop . . . . . 00-00-00 00:00 Live Time . . . . . 2229 Sec
Current Date . . . . . 00-00-00 00:00 Real Time . . . . . 0 Sec

```

Detector #: 0
Energy(keV) = 0.00 + 0.250*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 00-00-00 00:00

FWHM (keV) = 2.00 + 0.000*E0 + 0.000+000*E0^2 + 0.000+000*E0^3 00-00-00 00:00
Where E0 = sqrt(Energy in keV)

Sensitivity	2.00	Search Start / End	0 / 8191
State Multiplier	2.00		

RBDI High Resolution Gamma Spectrometry Analysis

Quantum Technology

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: D-13 010159

Sample Size	5.93e+002 g	Spectrum File . . .	h:\pcaspc\010359.spm
Sampling Start	00-00-00 00:00	Counting Start . . .	00-00-00 00:00

```
Sampling Stop . . . . .00-00-00 00:00 | Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . .00-00-00 00:00 | Decay Time [OFF]. . . . . 0.00e+000 Hrs
```

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Efficiency File:h:\gdr\eff\500mar.off | Library File. . . h:\gdr\lib\UTHACK.lib
ID. . . . . 500 ml Marinelli | ID. . . . U, Th, & Ac Natural Series + X

```

```
Eff.= 1/17.31e-002*En^2.40e+000 + 7.89e+001*En^0.95e-001] 02-01-01 12:00
```

```
Gamma Fraction Limit >= . . . 10.00 % | Decay Limit <= . . . 8.000 Halflives
Library Energy Tolerance. . . 3.00
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.....

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +/- 1.00sigma (uCi/g)	Half-life (hrs)	Peaks Found
Fr-221	Average:	5.27e-004 +/- 6.72e-006	3.63e-001	3 of 4

	79 80	5.68e-004	+7.10e-006		
	58 47	1.83e-004	+2.08e-005		
Pa-231	90 48	9.97e-004	+1.26e-005	2.97e+001	2 of 5
	90 48	8.15e-005	+1.23e-005		
	102 67	1.08e-003	+1.37e-005		
Pa-232	77 21	2.17e-004	+2.89e-008	1.06e+001	1 of 5
Pa-234	77 21	2.48e-004	+2.77e-008	4.47e+001	2 of 6
	77 21	3.73e-004	+2.77e-008		
	241 98	2.10e-004	+2.33e-006		
Tl-208	277 38	6.87e-005	+2.07e-006	5.09e-002	2 of 5
	277 38	1.36e-004	+6.76e-006		
	260 37	3.93e-005	+2.20e-006		
Th-232	915 38	5.56e-003	+1.44e-006	1.68e+004	1 of 2
Pa-234	96 66	6.80e-005	+1.26e-006	7.76e+000	3 of 14
	96 66	2.16e-005	+1.97e-005		
	123 20	4.18e-005	+1.82e-006		
	880 51	2.89e-004	+2.19e-006		
Pa-234	240 98	3.98e-005	+1.32e-006	6.95e+001	1 of 1
Tl-210	112 20	1.18e-005	+2.26e-007	3.27e-002	2 of 3
	799 70	3.21e-004	+3.40e-007		
	1310 00	7.81e-005	+1.66e-006		
Bi-214	112 20	5.24e-005	+1.89e-006	3.32e+001	1 of 1
	934 66	1.79e-005	+2.53e-005		
	1129 30	2.05e-004	+1.90e-006		
Po-210	806 80	5.30e-003	+2.78e-002	3.32e+002	1 of 1
Po-216	806 80	3.24e-003	+1.70e-002	3.06e+005	1 of 1
TOTAL:		8.61e-003	uCi/g		

CBA REPORT OF SUBSURFACE INVESTIGATION (APRIL 2001)

April 9, 2003

Reference No. 017770

DRAFT

Mr. Michael Ohm
Bell Boyd & Lloyd
Three First National Plaza
70 West Madison Street
Suite 3300
Chicago, Illinois 60602-42

Mr. Wilson Funkhouser
Funkhouser Vegosen Liebman & Dunn Ltd.
Suite 2410
55 West Monroe Street
Chicago, Illinois 60603-5008 Chicago, Illinois
Gentlemen:

Re: Subsurface Investigation
247 East Ohio
Chicago, Illinois

On behalf of *Draper & Kræmer, Inc. and D'Amico & Company, Consultants-Reviewers & Associates (CRA)* completed a limited Surface investigation at the property located at 247 East Ohio in Chicago, Illinois (Property). The purpose of the investigation was to evaluate the Property from the perspective of assessing subsurface radiation relative to naturally occurring background radiation levels in local unimpacted soils and to evaluate the potential volume of soil containing elevated radiation levels. The presence of soils containing elevated levels of radioactive thorium on the Property was confirmed during a previous investigation completed by CRA on February 9, 2001.

The Property is located near the Lindsay Light Superfund Site and Lindsay Light II Site where soils containing radioactive thorium have been previously removed. The primary objective of the limited Property investigation was to delineate radioactive thorium that existed above the cleanup level established by the United States Environmental Protection Agency (USEPA) for the neighboring Sites. The Property is currently an active pay parking lot located in the Streeterville area of Downtown Chicago. The Property is bounded by East Ohio Street to the north, Fairbanks Court to the east, East Grand Avenue to the south, and a high-rise condominium building to the west.

April 9, 2003

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Reference No. 017770

DRAFT

In brief, results from CRA's investigation suggest that the presence of radioactive thorium at levels above the cleanup level established by the USEPA may predominate in two areas located within the western third of the Property. The following discussion summarizes the activities completed during the investigation and presents the data obtained therefrom.

PREVIOUS INVESTIGATION

Field activities associated with the initial Property investigation were conducted on February 9, 2001. Investigative activities completed consisted of the following:

- completion of a surficial survey of the Property;
- installation and sampling of four soil borings at locations where elevated radiation levels were measured during the walkover survey;
- downhole measurement of radiation levels within the completed soil borings; and
- analysis of one soil sample using high-resolution gamma spectroscopy to identify and measure radiation levels.

Results from this investigation confirmed the presence of radioactive thorium in the soil at levels above the cleanup level established by the USEPA for the Lindsay Light Site.

SCOPE OF WORK

Field activities associated with the supplemental Property investigation were conducted during the week of April 16, 2001. Investigative activities completed consisted of the following:

- installation and sampling of 59 soil borings at locations where elevated radiation levels were observed during the walkover survey and at subsurface areas anticipated to be disturbed by Draper & Kramer's development of the Site;
- downhole measurement of radiation levels within the completed soil borings;
- analysis of 94 soil samples using high-resolution gamma spectroscopy to identify and measure radiation levels; and
- surveying of the completed soil boring locations.

April 9, 2003

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Reference No. 017770

DRAFT

Intervals This poor sample recovery may have affected the analytical results (i.e., provided a few hits in affected samples) from samples collected from these intervals. Fill material was encountered just below the asphalt/gravel cover layer and extended to depths ranging from approximately 7.5 to 10.8 feet below ground surface (bgs). At soil boring SB-11, a 3 to 5-inch thick layer of fine-grained silver/gray sand was encountered. This sand exhibited high radium levels and is believed to possibly be thorium tailings.

The fill material was underlain by native sand. The sand consisted mainly of fine-grained dark sand that was tan or gray in color. However, sand containing varying amounts of medium and coarse sand grains was also encountered across the Property.

Groundwater was not encountered in any of the soil borings.

Downhole Measurements

As discussed previously, RSSI measured downhole radiation levels at 1-foot intervals within the soil borings. Downhole radiation level measurements are summarized in RSSI's report provided in Attachment B. Downhole radiation measurements ranged from 3,645 counts per minute (CPM) from the 8-foot interval of SB-28 to 2,239,217 CPM from the 2 foot interval of SB-11. Figures 2 through 12 summarize and illustrate typical contours for the downhole measurements recorded from the 1 through 11-foot bgs intervals. In general, it appears that measurements between 5,000 and 12,000 CPM appear to represent native soils or fill materials with only trace amounts of rubble (i.e., background levels). Measurements between 12,000 and 40,000 CPM appear to represent fill material with increasing amounts of rubble or soil in close proximity to possible thorium-impacted soil or soil containing trace amounts of thorium impacted soils. Measurements of greater than 40,000 CPM are over four times background and are suggestive of soil that may contain radioactive materials in excess of 7.1 pCi/g.

As illustrated on Figures 2 through 12, there appear to be two areas along the western third of the Property where elevated measurements were recorded. The smaller of these two areas occurred at soil boring location SB-40. Radiation measurements above background were recorded at the 1, 2 and 3-foot bgs intervals, with the highest level of 162,798 CPM measured in the 2 foot bgs interval. The elevated radiation measurements in this area appear to be somewhat limited to the upper 3 feet of soil.

The second and larger area of elevated radiation measurements occurred at soil borings SB-4, SB-9, SB-11, SB-12, and SB-14. This area represents the same general area where soils containing

April 9, 2003

- 3 -

Reference No. 017770

DRAFT

RSSI of Morton Grove, Illinois was retained by CRA to provide downhole radiation measurements and sample analysis during the Property investigation. Mid-America Drilling Services, Inc. of Elburn, Illinois was retained by CRA to provide drilling services. Bollinger, Lach & Associates, Inc. of Oak Brook, Illinois was retained by CRA to provide surveying services.

Soil Borings

A total of 59 soil borings (SB-1 through SB-59) were advanced to measure radiation levels along the vertical profile of the open borehole. Soil boring maximum depths ranged from 11 to 13 feet below ground surface (bgs). Soils borings were advanced using a rotary drill rig equipped with 4 1/4-inch inside diameter hollow stem augers (HSA). Continuous split-spoon samples were collected during borehole advancement. Collected soil samples were inspected by a CRA geologist and described in accordance with the Unified Soil Classification System (USCS). Soil samples were retained in resealable plastic bags for possible analysis. Soil boring stratigraphic logs are provided in Attachment A.

Figure 1 illustrates the locations of the supplemental investigation soil borings completed during April along with the February initial investigation soil borings. This figure also illustrates estimated approximate locations of subsurface areas anticipated to be disturbed by Draper & Kramer's development of the Site (basement structures and caissons/building footings indicated by the figure provided previously to CRA by Bell, Boyd & Lloyd LLC).

Borehole Logging

Upon completion of the soil boring, a section of 3-inch diameter polyvinyl chloride (PVC) well casing was lowered into the borehole and the HSAs were retracted, leaving the PVC casing in place. An RSSI Health Physicist then measured radiation levels at 1-foot intervals within the casing. Borehole radiation measurements were taken using a 2" x 2" sodium iodide detector attached to a Ludlum Model 2281 survey meter. This equipment, as used, is capable of measuring radiation levels in the soil in an approximate 2 to 3-foot radius around the soil boring. Therefore, the presence of radioactive materials in soils located outside of this 2 to 3-foot radius would likely not be detected. Once the measurements were completed, the PVC casing was removed from the borehole and used at the next soil boring location. Boreholes were backfilled with soil cuttings and bentonite chips and then capped with an asphalt patch.

¹ Since surveyed drawings were unavailable from Draper & Kramer, CRA utilized a "best guess" approach to approximate development locations.

April 9, 2003

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Reference No. 017770

DRAFT

radioactive thorium at levels above the cleanup level established by the USEPA were observed during the February 2001 initial investigation. Elevated radiation measurements were recorded at the 1 through 8-foot bgs intervals, with the highest level of 2,239,217 CPM measured in the 2-foot bgs interval of SB-11. This interval corresponds with the soil boring location and interval where the seam of silver sand exhibiting elevated radiation reading was observed. The elevated radiation measurements in this area appear to extend all the way to the native sand encountered at depths of between approximately 7 and 9 feet bgs.

The depth at which elevated radiation measurements were recorded at the larger of the two areas (soil borings SB-4, SB-9, SB-11, SB-12, and SB-14) suggests that a depression in the ground may have been backfilled with soil/rubble containing thorium. Sanborn Maps from 1927 show several small buildings on the Property.

Laboratory Results

RSSI's analytical report for the samples analyzed is included in Attachment B. As discussed previously, the USEPA set the background radium level in the area at 2.1 pCi/g. Therefore the USEPA cleanup level is 5 pCi/g plus 2.1 pCi/g or 7.1 pCi/g.

Analytical results from RSSI are summarized on Table 1. Laboratory results indicate levels above 7.1 pCi/g in eight soil samples collected from six soil borings (SB-4, SB-9, SB-11, SB-12, SB-14, and SB-40). The highest radiation measurement of 2,890 pCi/g was recorded from the sample collected from the 1 to 3-foot bgs interval of SB-11. This soil sample contained the fine-grained silver sand encountered at a depth of 1.5-feet bgs in SB-11. Laboratory results from soil borings where poor sample recovery occurred due to the presence of rubble might not accurately represent actual in-situ soil radiation levels within these intervals. Therefore, laboratory results may have underestimated the actual number of locations where materials containing levels of thorium above 7.1 pCi/g are located.

CONCLUSIONS

Results from the limited investigation completed at the Property have confirmed the presence of radioactive materials in the soil in at least two areas along the western portion of the Property at levels above the cleanup level established by the USEPA.

Again, thank you for selecting CRA. If you have any questions, please call me at (773) 380-9933.

April 9, 2003

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Reference No. 017770

DRAFT

Results from the downhole radiation survey are provided in RSSI's report provided in Attachment B.

Soil Analysis

A total of 95 soil samples were retained for analysis from soil borings. Soil samples were analyzed by high resolution gamma spectroscopy using a high purity germanium (HPGe) detector. Soil samples were counted for 1 hour and analyzed for the thorium, uranium, and actinium series and potassium-40. Actinium-228 (Ac-228) is used as a surrogate for radium-228 (Ra-228) in the thorium series. Lead 214 (Pb-214) is used as a surrogate for radium-226 (Ra-226) in the uranium series. The concentration of Ac-228 and Pb-214 are equal or approaching the concentrations of Ra-228 and Ra-226 in the soil. The USEPA has relied upon a soil radium standard for uranium and thorium sites found in Part 40, Title 192 of the Code of Federal Regulations (40 CFR 192). This standard is 5 picocuries per gram (pCi/g) of total radium (radium-226 plus radium-228) over background. The USEPA set the background radium level in the area at 2.1 pCi/g. Therefore the USEPA cleanup level is 5 pCi/g plus 2.1 pCi/g or 7.1 pCi/g at the neighboring Sites.

Surveying

The locations of the completed soil boring were surveyed with respect to vertical and horizontal control. Soil boring survey measurements were referenced to the coordinate system used on the Plat of Survey drawing (National Survey Services, Inc. survey no. N-11759 dated February 10, 1993) provided to CRA by Draper & Kramer on January 30, 2001.

INVESTIGATION RESULTSSite Stratigraphy

Descriptions of the soil stratigraphy beneath the Property are provided on the stratigraphic logs provided in Attachment A. In general, two main stratigraphic units were encountered within the upper 13 feet of soil beneath the Property. The first unit consists of fill material that was encountered in all of the soil borings. The fill material consists mainly of silt, sand, and clay with varying amounts of gravel. In addition, the fill material also contain varying amounts of rubble consisting of brick fragments, concrete and minor amounts of slag, coal, glass, and wood. Significant amounts of brick and concrete rubble were encountered in numerous soil borings and resulted in poor to no sample recovery in the split-spoon samples collected from these

April 9, 2003

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Reference No. 017770

DRAFT

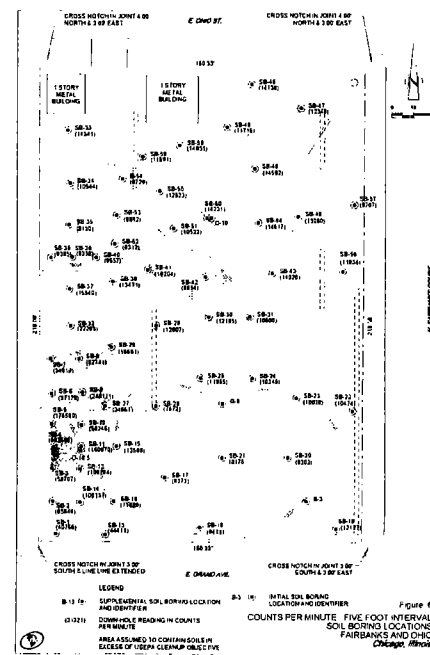
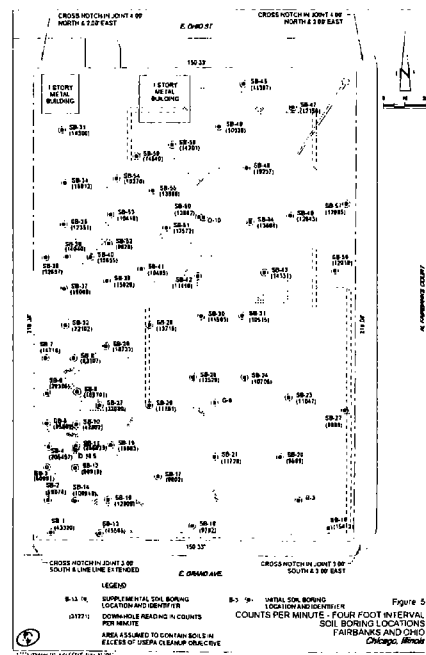
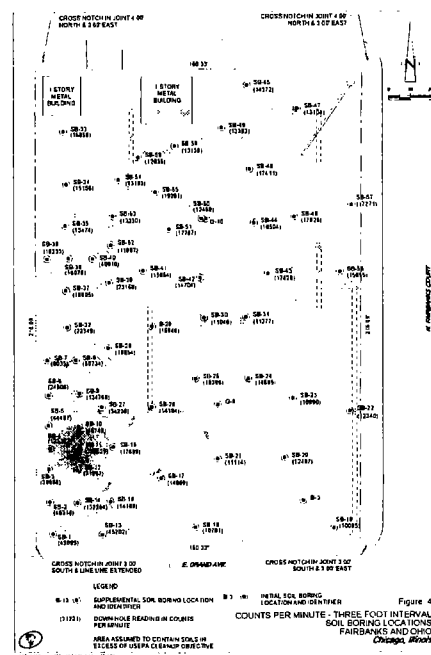
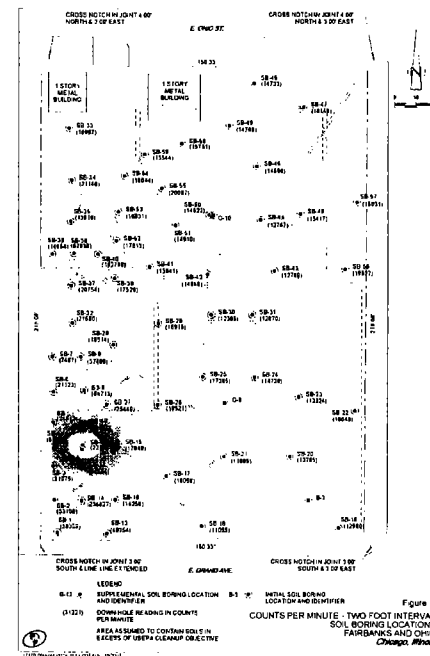
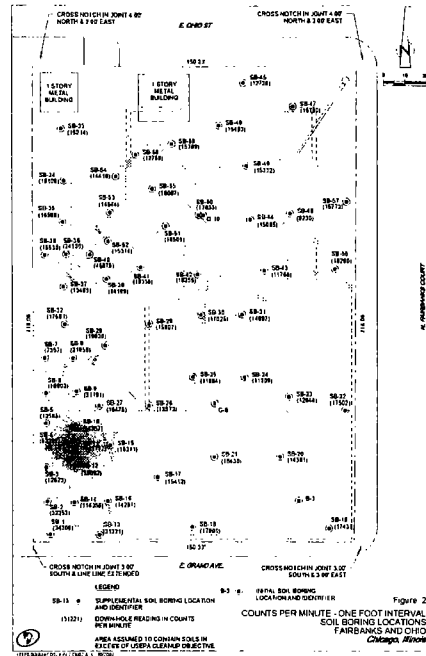
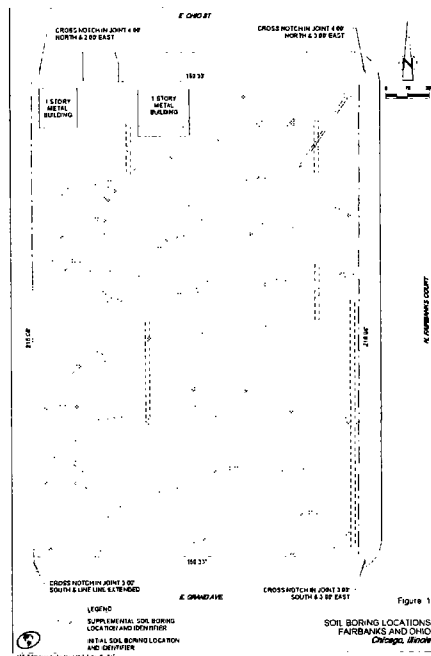
Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Bruce Clegg

BCC/ko/1
Attachments

c.c. Thomas Carcy, Bell, Boyd & Lloyd
Alfred D'Ancona, III, Trustee, c/o D'Ancona & Company
Carl Peterson, Draper & Kramer
Walter Pochron, CRA



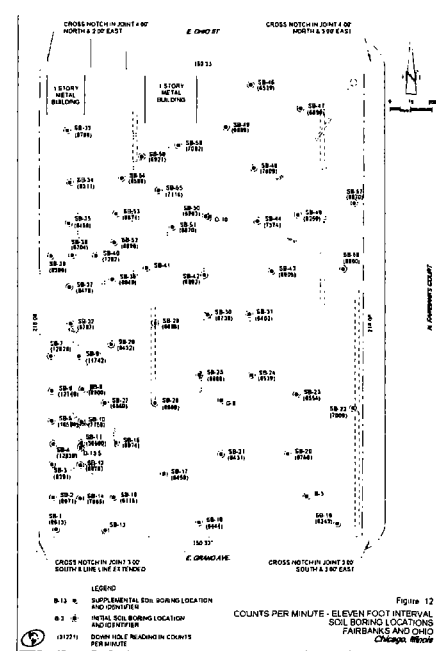
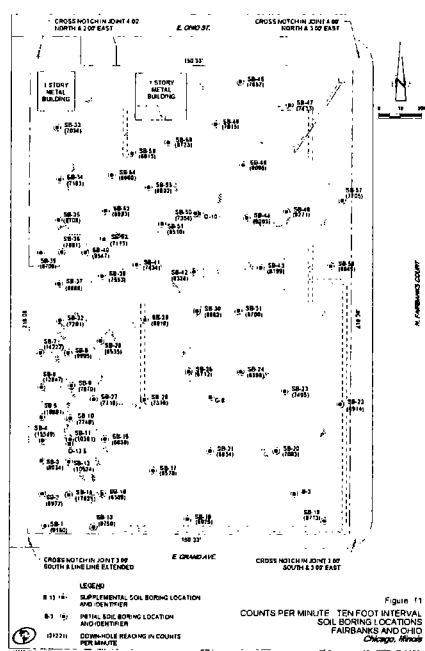
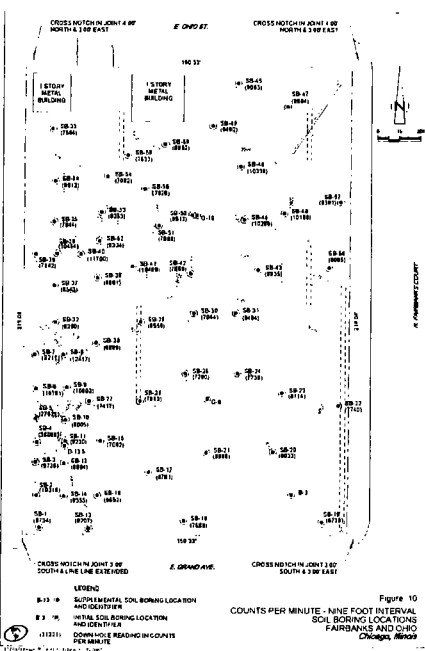
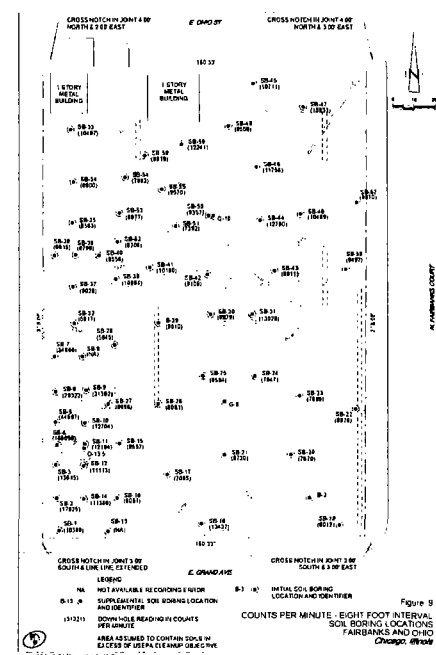
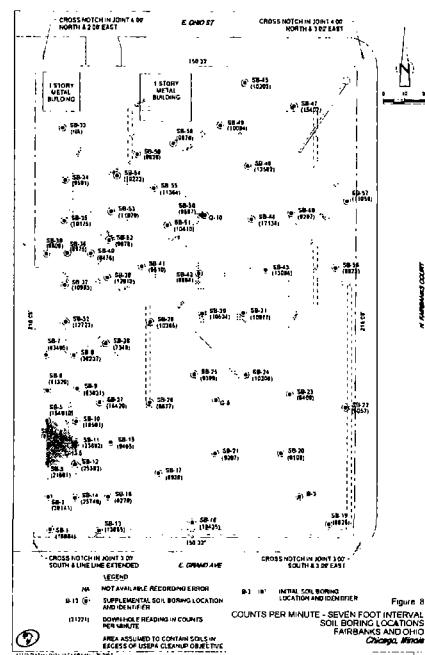
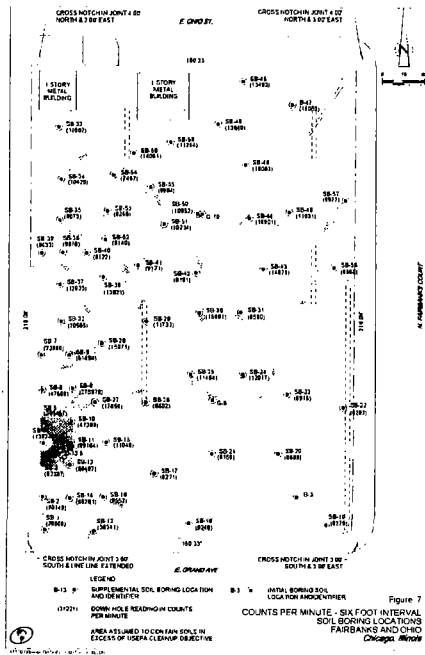


TABLE 1
SUMMARY OF LABORATORY RESULTS
247 EAST OHIO
CHICAGO, ILLINOIS

RSSI Sample NO.	Borehole ID	Depth ft bgs ¹	As-228 pCi/g ²	Pb-214 pCi/g ²	Total pCi/g ²
011294	SB-1	1-3	0	2.000	2.0
011295	SB-1	7-9	0	3.000	3.0
011296	SB-2	1-3	0	1.560	1.6
011297	SB-2	5-7	1.8	2.540	4.3
011299	SB-3	3-5	0.729	1.360	2.1
011300	SB-3	7-9	0.297	0.460	0.8
011301	SB-4	1-3	1.06	2.130	3.2
011303	SB-4	5-7	107	35.800	35.9
011302	SB-4	9-11	0.946	0.792	1.7
011304	SB-5	5-7	2.56	4.470	7.0
011305	SB-5	9-11	0	0.687	0.7
011306	SB-6	1-3	0	1.460	1.5
011307	SB-6	5-7	0.913	1.790	2.6
011308	SB-7	7-9	0.474	1.250	1.7
011309	SB-8	1-3	1.69	3.240	4.9
011310	SB-8	7-9	0	1.910	1.9
011311	SB-9	1-3	1.95	2.920	4.9
011312	SB-9	5-7	96.8	49.400	146.2
011313	SB-10	3-5	0.997	1.190	2.2
011314	SB-10	7-9	0	0.797	0.8
011315	SB-11	1-3	1210	1290.000	2500
011316	SB-11	7-9	6.92	2.270	9.2
011317	SB-11	9-11	1.56	0.407	2.0
011318	SB-12	1-3	1.13	1.590	2.7
011319	SB-12	3-5	2.38	5.720	8.1
011320	SB-13	3-5	1.94	2.220	4.2
011321	SB-14	1-3	51.7	9.600	61.3
011322	SB-14	3-5	7.35	1.770	9.1
011323	SB-15	1-3	1.73	1.240	2.9
011325	SB-16	3-5	0.491	0.517	1.0
011326	SB-17	3-5	0.469	0.668	1.1
011327	SB-18	1-3	0	1.020	1.0
011328	SB-19	3-5	1.22	1.610	2.8
011329	SB-20	3-5	0.441	0.563	1.0
011330	SB-21	3-5	0.594	0.522	1.2
011331	SB-22	3-5	0	0.919	0.9
011332	SB-23	1-3	0.653	0.955	1.6
011333	SB-24	1-3	0.74	1.030	1.7
011334	SB-24	5-7	0	0.629	0.6
011335	SB-25	2-4	0.684	1.100	1.8
011336	SB-26	2-4	0.925	2.090	3.0
011337	SB-26	4-6	0	1.080	1.1

TABLE 1
SUMMARY OF LABORATORY RESULTS
247 EAST OHIO
CHICAGO, ILLINOIS

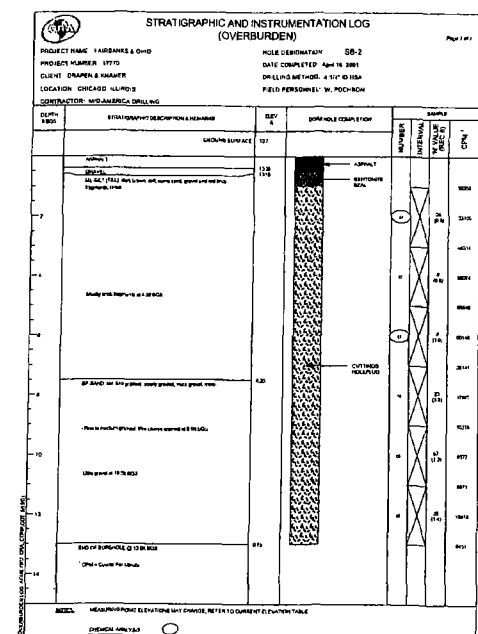
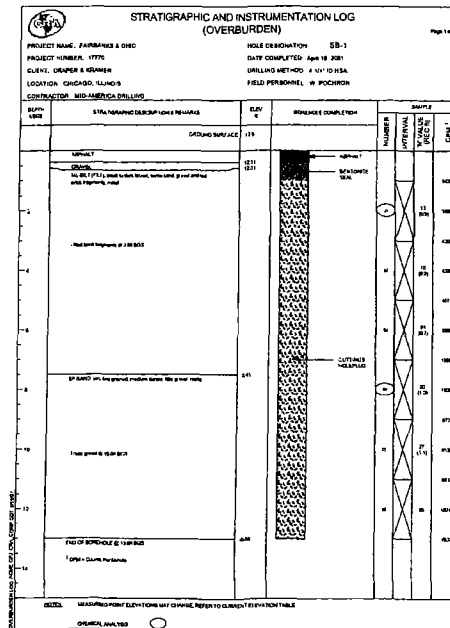
RSSI Sample NO.	Borehole ID	Depth ft bgs ¹	As-228 pCi/g ²	Pb-214 pCi/g ²	Total pCi/g ²
011338	SB-27	2-4	1.81	3.270	5.1
011339	SB-27	4-6	1.54	3.240	4.8
011340	SB-27	8-10	0.477	0.890	1.4
011341	SB-28	1-3	0.891	2.470	3.4
011342	SB-28	7-9	0	1.190	1.2
011343	SB-29	1-3	0.738	1.180	1.9
011344	SB-29	5-7	0	1.560	1.6
011386	SB-30	1-3	0.976	1.850	2.8
011387	SB-30	5-7	0.441	1.150	1.6
011388	SB-31	1-3	0.952	2.220	3.2
011389	SB-31	7-9	0.727	1.220	2.0
011390	SB-33	1-3	1.02	2.610	3.6
011391	SB-33	5-7	0	1.691	1.7
011392	SB-34	1-3	0.957	2.810	3.8
011393	SB-34	5-7	0	1.380	1.4
011394	SB-35	1-3	0	1.360	1.4
011395	SB-35	3-5	0.931	2.240	3.2
011396	SB-36	1-3	0	2.590	2.6
011397	SB-36	5-7	0	0.880	0.9
011398	SB-37	1-3	1.83	3.500	5.3
011399	SB-37	3-5	0.676	1.970	2.6
011400	SB-38	1-3	0.904	2.810	3.7
011401	SB-38	5-7	0	1.560	1.6
011402	SB-39	5-7	0.511	1.170	1.7
011403	SB-40	1-3	15	11.000	11.0
011404	SB-40	3-5	4.478	1.620	6.1
011405	SB-41	1-3	0.874	2.260	3.1
011406	SB-42	1-3	0.745	2.250	3.0
011407	SB-43	3-5	0.556	1.080	1.6
011408	SB-44	3-5	0.709	2.440	3.1
011409	SB-45	6-8	0	1.050	1.1
011410	SB-46	3-5	0.748	2.600	3.4
011411	SB-47	1-3	0.951	2.080	3.0
011412	SB-48	3-5	1.17	1.910	3.1
011413	SB-49	5-7	0.607	1.220	1.8
011414	SB-50	2-4	0.9	2.410	3.3
011415	SB-52	2-4	0.536	1.640	2.2
011416	SB-53	1-3	0	2.390	2.4
011417	SB-53	7-9	0	1.550	1.6
011418	SB-54	1-3	0.856	3.530	4.4
011419	SB-54	5-7	0	1.110	1.1
011420	SB-55	1-3	0.837	3.040	3.9

TABLE 1
SUMMARY OF LABORATORY RESULTS
247 EAST OHIO
CHICAGO, ILLINOIS

RSSI Sample NO.	Borehole ID	Depth ft bgs ¹	As-228 pCi/g ²	Pb-214 pCi/g ²	Total pCi/g ²
011421	SB-55	5-7	0	0.993	1.0
011422	SB-56	1-3	1.49	2.890	4.4
011423	SB-57	1-3	0.7	1.990	2.7
011424	SB-58	3-5	1.03	2.610	3.6
011425	SB-59	3-5	0	0.970	1.0
011426	B3	1-3	0.604	2.500	3.1
011427	C8	1-3	0.659	3.320	4.0

¹ ft bgs - feet below ground surface
² uCi/g - micro Curries per gram
³ pCi/g - pico Curries per gram
 * - value exceeds US EPA cleanup objective of 7.1 pCi/g

ATTACHMENT A
SOIL BORING STRATIGRAPHIC LOGS



PROJECT NAME: PARKWAY & CHD
PROJECT NUMBER: 17778
CLIENT: GRANGER & KRAMER
LOCATION: CHICAGO, ILLINOIS
CONTRACTOR: KULAMATICA TRAIL LLC

POLE IDENTIFICATION: SS-B
DATE DRILLED: April 18, 2021
DRILLING METHOD: 4 1/2" ID HSA
FIELD PERSONNEL: W. POCHRON

Borehole #1

DEPTH (FEET) | **SOIL DESCRIPTION (REMARKS) ON A MINIMUM** | **DEPTH (FEET)** | **BOREHOLE #1 CORRECTION FACTOR** | **SAMPLE**

0 | **GROUND SURFACE** | **0.0** | **GROUNDWATER** | **NUMBER** | **DEPTH (FEET)** | **DESCRIPTION** | **DEPTH (FEET)** | **DESCRIPTION**

1 | **CLAY** | **1.0** | **CLAY** | **1** | **CLAY** | **1.0** | **CLAY**

2 | **CLAY** | **2.0** | **CLAY** | **2** | **CLAY** | **2.0** | **CLAY**

3 | **CLAY** | **3.0** | **CLAY** | **3** | **CLAY** | **3.0** | **CLAY**

4 | **CLAY** | **4.0** | **CLAY** | **4** | **CLAY** | **4.0** | **CLAY**

5 | **CLAY** | **5.0** | **CLAY** | **5** | **CLAY** | **5.0** | **CLAY**

6 | **CLAY** | **6.0** | **CLAY** | **6** | **CLAY** | **6.0** | **CLAY**

7 | **CLAY** | **7.0** | **CLAY** | **7** | **CLAY** | **7.0** | **CLAY**

8 | **CLAY** | **8.0** | **CLAY** | **8** | **CLAY** | **8.0** | **CLAY**

9 | **CLAY** | **9.0** | **CLAY** | **9** | **CLAY** | **9.0** | **CLAY**

10 | **CLAY** | **10.0** | **CLAY** | **10** | **CLAY** | **10.0** | **CLAY**

11 | **CLAY** | **11.0** | **CLAY** | **11** | **CLAY** | **11.0** | **CLAY**

12 | **CLAY** | **12.0** | **CLAY** | **12** | **CLAY** | **12.0** | **CLAY**

13 | **CLAY** | **13.0** | **CLAY** | **13** | **CLAY** | **13.0** | **CLAY**

14 | **CLAY** | **14.0** | **CLAY** | **14** | **CLAY** | **14.0** | **CLAY**

15 | **CLAY** | **15.0** | **CLAY** | **15** | **CLAY** | **15.0** | **CLAY**

16 | **CLAY** | **16.0** | **CLAY** | **16** | **CLAY** | **16.0** | **CLAY**

17 | **CLAY** | **17.0** | **CLAY** | **17** | **CLAY** | **17.0** | **CLAY**

18 | **CLAY** | **18.0** | **CLAY** | **18** | **CLAY** | **18.0** | **CLAY**

19 | **CLAY** | **19.0** | **CLAY** | **19** | **CLAY** | **19.0** | **CLAY**

20 | **CLAY** | **20.0** | **CLAY** | **20** | **CLAY** | **20.0** | **CLAY**

21 | **CLAY** | **21.0** | **CLAY** | **21** | **CLAY** | **21.0** | **CLAY**

22 | **CLAY** | **22.0** | **CLAY** | **22** | **CLAY** | **22.0** | **CLAY**

23 | **CLAY** | **23.0** | **CLAY** | **23** | **CLAY** | **23.0** | **CLAY**

24 | **CLAY** | **24.0** | **CLAY** | **24** | **CLAY** | **24.0** | **CLAY**

25 | **CLAY** | **25.0** | **CLAY** | **25** | **CLAY** | **25.0** | **CLAY**

26 | **CLAY** | **26.0** | **CLAY** | **26** | **CLAY** | **26.0** | **CLAY**

27 | **CLAY** | **27.0** | **CLAY** | **27** | **CLAY** | **27.0** | **CLAY**

28 | **CLAY** | **28.0** | **CLAY** | **28** | **CLAY** | **28.0** | **CLAY**

29 | **CLAY** | **29.0** | **CLAY** | **29** | **CLAY** | **29.0** | **CLAY**

30 | **CLAY** | **30.0** | **CLAY** | **30** | **CLAY** | **30.0** | **CLAY**

31 | **CLAY** | **31.0** | **CLAY** | **31** | **CLAY** | **31.0** | **CLAY**

32 | **CLAY** | **32.0** | **CLAY** | **32** | **CLAY** | **32.0** | **CLAY**

33 | **CLAY** | **33.0** | **CLAY** | **33** | **CLAY** | **33.0** | **CLAY**

34 | **CLAY** | **34.0** | **CLAY** | **34** | **CLAY** | **34.0** | **CLAY**

35 | **CLAY** | **35.0** | **CLAY** | **35** | **CLAY** | **35.0** | **CLAY**

36 | **CLAY** | **36.0** | **CLAY** | **36** | **CLAY** | **36.0** | **CLAY**

37 | **CLAY** | **37.0** | **CLAY** | **37** | **CLAY** | **37.0** | **CLAY**

38 | **CLAY** | **38.0** | **CLAY** | **38** | **CLAY** | **38.0** | **CLAY**

39 | **CLAY** | **39.0** | **CLAY** | **39** | **CLAY** | **39.0** | **CLAY**

40 | **CLAY** | **40.0** | **CLAY** | **40** | **CLAY** | **40.0** | **CLAY**

41 | **CLAY** | **41.0** | **CLAY** | **41** | **CLAY** | **41.0** | **CLAY**

42 | **CLAY** | **42.0** | **CLAY** | **42** | **CLAY** | **42.0** | **CLAY**

43 | **CLAY** | **43.0** | **CLAY** | **43** | **CLAY** | **43.0** | **CLAY**

44 | **CLAY** | **44.0** | **CLAY** | **44** | **CLAY** | **44.0** | **CLAY**

45 | **CLAY** | **45.0** | **CLAY** | **45** | **CLAY** | **45.0** | **CLAY**

46 | **CLAY** | **46.0** | **CLAY** | **46** | **CLAY** | **46.0** | **CLAY**

47 | **CLAY** | **47.0** | **CLAY** | **47** | **CLAY** | **47.0** | **CLAY**

48 | **CLAY** | **48.0** | **CL**

[illegible]

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: FAIRBANKS & OHIO
 PROJECT NUMBER: 17778
 CLIENT: DRUMPER & PRAMER
 LOCATION: CHICAGO, ILLINOIS
 COASTAL WATERS, WEST AMERICA (GULF OF MEXICO)

HOE INFORMATION: SB-10
 DATES COMPLETED: April 17, 1981
 DRILLING METHOD: 4 1/2" x 10' JBR
 FIELD PERSONNEL: W. POCHMUT

DEPTH METER	STRATIGRAPHIC DESCRIPTIONS & REMARKS	DEPTH METER	DEPTH-NO. COMPLETION	SAMPLE NUMBER	DEPTH METER	DEPTH-NO. COMPLETION
0	GRAVELLY SURFACE	1.1			0	
1	GRAVELLY SURFACE	1.1			0	
2	GRAVELLY SURFACE	1.1			0	
3	GRAVELLY SURFACE	1.1			0	
4	GRAVELLY SURFACE	1.1			0	
5	GRAVELLY SURFACE	1.1			0	
6	GRAVELLY SURFACE	1.1			0	
7	GRAVELLY SURFACE	1.1			0	
8	GRAVELLY SURFACE	1.1			0	
9	GRAVELLY SURFACE	1.1			0	
10	GRAVELLY SURFACE	1.1			0	
11	GRAVELLY SURFACE	1.1			0	
12	GRAVELLY SURFACE	1.1			0	
13	GRAVELLY SURFACE	1.1			0	
14	GRAVELLY SURFACE	1.1			0	
15	GRAVELLY SURFACE	1.1			0	
16	GRAVELLY SURFACE	1.1			0	
17	GRAVELLY SURFACE	1.1			0	

NOTE: THE SURFACE POINTS ARE NOT NEARLY NEAR TO CURRENT ELEVATION TABLE

[illegible][illegible][illegible][illegible]

STENOGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)		DATE COMPLETED: APR 18 2001		PAGE 1 of 1	
PROJECT NAME: FAIRBANKS & DINO		HOLE DESIGNATION: 58-22			
PROJECT NUMBER: 17790		DRIELLES NO/HOLE: 4 1/4" ID X 30'			
CLIENT: DRAKES & FUGENER		FIELD PERSONNEL: W. FUCHSEN			
LOCATION: CHICAGO RUNNER					
CONTRACTOR: MCKINSTRY SURVEILLING					
DEPTH DOWN	ATRIAL/FORMING DESCRIPTION and MEASURED	CELT W	SONG-HOLE COMPLETION	NUMBER OF INTERVAL SAMPLES MADE	DEPTH DOWN
	GROUND SURFACES	1.33			
	ORANGE GRAVEL MATERIAL AND BRICKS	1.00 1.00	REFILL WITH GRAVEL AND BRICKS		
2					1.00
4	AS 50' PULL 100' DOWN, 400' down after 100' ground and 400' stop	0.30			1.00
6					1.00
8	30' SANDY PULL 100' DOWN, 400' down after 100' ground and 400' stop	1.30			1.00
10					1.00
12	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
14					1.00
16	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
18					1.00
20	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
22					1.00
24	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
26					1.00
28	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
30					1.00
32	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
34					1.00
36	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
38					1.00
40	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
42					1.00
44	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
46					1.00
48	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
50					1.00
52	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
54					1.00
56	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
58					1.00
60	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
62					1.00
64	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
66					1.00
68	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
70					1.00
72	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
74					1.00
76	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
78					1.00
80	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
82					1.00
84	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
86					1.00
88	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
90					1.00
92	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
94					1.00
96	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
98					1.00
100	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
102					1.00
104	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
106					1.00
108	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
110					1.00
112	100' down, 400' down after 100' ground and 400' stop	0.30			1.00
114					1.00
116	100' down, 400' down after 100' ground and 400' stop	0.30	</		

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: FAIRBANKS & SMO
 PROJECT NUMBER: 1970
 CLIENT: SHAPIRO & FOUNDER
 LOCATION: CHICAGO, ILLINOIS
 CONTRACTOR: MID-AMERICA DRILLING

DATE: 1982
 FILE NO: SB 24
 DATE COMPLETED: Aug 18, 2001
 DRILLING METHOD: 4 1/4" ID HSA
 FIELD PERSONNEL: W. PODGORN

DEPTH FEET	DESCRIPTION (COLOR, TYPE & LOG SYMBOL)	ELEVATION FEET	REMARKS & COMPLETION	SAMPLE #	
				NUMBER	INSTRUMENTATION
0	GROUND SURFACE	11.7			
1.5	Hardpan (F1) with gravel, thin, sandy, dark gray granular, fine and medium sand	11.0			
2.0	No Sample (F2) with gravel, thin, sandy, dark gray granular, fine and medium sand	10.5			
2.5	No Sample (F3) with gravel, thin, sandy, dark gray granular, fine and medium sand	10.0			
3.0	No Sample (F4) with gravel, thin, sandy, dark gray granular, fine and medium sand	9.5			
3.5	No Sample (F5) with gravel, thin, sandy, dark gray granular, fine and medium sand	9.0			
4.0	No Sample (F6) with gravel, thin, sandy, dark gray granular, fine and medium sand	8.5			
4.5	No Sample (F7) with gravel, thin, sandy, dark gray granular, fine and medium sand	8.0			
5.0	No Sample (F8) with gravel, thin, sandy, dark gray granular, fine and medium sand	7.5			
5.5	No Sample (F9) with gravel, thin, sandy, dark gray granular, fine and medium sand	7.0			
6.0	No Sample (F10) with gravel, thin, sandy, dark gray granular, fine and medium sand	6.5			
6.5	No Sample (F11) with gravel, thin, sandy, dark gray granular, fine and medium sand	6.0			
7.0	No Sample (F12) with gravel, thin, sandy, dark gray granular, fine and medium sand	5.5			
7.5	No Sample (F13) with gravel, thin, sandy, dark gray granular, fine and medium sand	5.0			
8.0	No Sample (F14) with gravel, thin, sandy, dark gray granular, fine and medium sand	4.5			
8.5	No Sample (F15) with gravel, thin, sandy, dark gray granular, fine and medium sand	4.0			
9.0	No Sample (F16) with gravel, thin, sandy, dark gray granular, fine and medium sand	3.5			
9.5	No Sample (F17) with gravel, thin, sandy, dark gray granular, fine and medium sand	3.0			
10.0	No Sample (F18) with gravel, thin, sandy, dark gray granular, fine and medium sand	2.5			
10.5	No Sample (F19) with gravel, thin, sandy, dark gray granular, fine and medium sand	2.0			
11.0	No Sample (F20) with gravel, thin, sandy, dark gray granular, fine and medium sand	1.5			
11.5	No Sample (F21) with gravel, thin, sandy, dark gray granular, fine and medium sand	1.0			
12.0	No Sample (F22) with gravel, thin, sandy, dark gray granular, fine and medium sand	0.5			
12.5	No Sample (F23) with gravel, thin, sandy, dark gray granular, fine and medium sand	0.0			
13.0	No Sample (F24) with gravel, thin, sandy, dark gray granular, fine and medium sand	-0.5			
13.5	No Sample (F25) with gravel, thin, sandy, dark gray granular, fine and medium sand	-1.0			
14.0	No Sample (F26) with gravel, thin, sandy, dark gray granular, fine and medium sand	-1.5			

REMARKS: NO SAMPLES WERE TAKEN AT THESE DEPTHS. REFER TO CORRESPONDING LOG FOR FURTHER INFORMATION.

STRATIGRAPHIC AND GEOLOGIC COLUMN LOG (OVERBURDEN)

PROJECT NAME / AKA/BANKS & DUGO
 PROJECT NUMBER: 0779
 CLIENT: DEANER & KESNER
 LOCATION: CHICAGO, ILLINOIS
 CONTRACTOR: MICHIGAN DRILLING

HOLE DEPTH/LOCATION: 55-25
 DATE COMPLETED: 10-11-1961
 DRILLING METHOD: 4 1/2" ID HSA
 FIELD PERSONNEL: M. POCHNER

DEPTH (FEET)	STRATIGRAPHIC DESCRIPTION (Color & % in Grains)	REMARKS	SOIL-HOLE COMPLETION	NUMBER OF INTERVALS	WATER VALUE (GPM)	DEPTH (FEET)
0.00	GROUNDED SURFACE					0.00
1.00						1.00
2.00						2.00
3.00						3.00
4.00						4.00
5.00						5.00
6.00						6.00
7.00						7.00
8.00						8.00
9.00						9.00
10.00						10.00
11.00						11.00
12.00						12.00
13.00						13.00
14.00						14.00
15.00						15.00
16.00						16.00
17.00						17.00
18.00						18.00
19.00						19.00
20.00						20.00
21.00						21.00
22.00						22.00
23.00						23.00
24.00						24.00
25.00						25.00
26.00						26.00
27.00						27.00
28.00						28.00
29.00						29.00
30.00						30.00
31.00						31.00
32.00						32.00
33.00						33.00
34.00						34.00
35.00						35.00
36.00						36.00
37.00						37.00
38.00						38.00
39.00						39.00
40.00						40.00
41.00						41.00
42.00						42.00
43.00						43.00
44.00						44.00
45.00						45.00
46.00						46.00
47.00						47.00
48.00						48.00
49.00						49.00
50.00						50.00
51.00						51.00
52.00						52.00
53.00						53.00
54.00						54.00
55.00						55.00
56.00						56.00
57.00						57.00
58.00						58.00
59.00						59.00
60.00						60.00

[illegible]

STRATIGRAPHIC AND CORRELATION LOG (OVERBORDEN)

PROJECT NAME: FATHOMERS & ON/O
PROJECT NUMBER: 1717D
CLIENT: GRAPHER & KILMER
LOCATION: CHICAGO, ILLINOIS

LOGS COMPLETED: April 18, 2001
DRAWING METHOD: 4 1/4" x 11" 1/2" H&A
FIELD PERSONNEL: W. F. KODONER

CONTINUATION OF: H&A CORRELATION LOG

DEPTH FEET	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH FEET	REMARKS / CORRELATION	INSTRUMENT INTERVAL FEET	SAMPLE DEPTH FEET
1.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
2.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
3.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
4.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
5.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
6.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
7.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
8.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
9.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
10.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
11.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
12.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
13.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00
14.00	CLAYSTONE	11.00	ADHOLE	11.00	11.00

REMARKS: H&A CORRELATION LOG

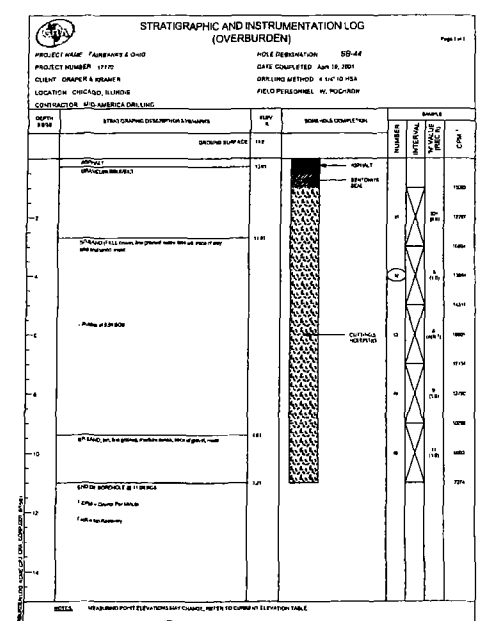
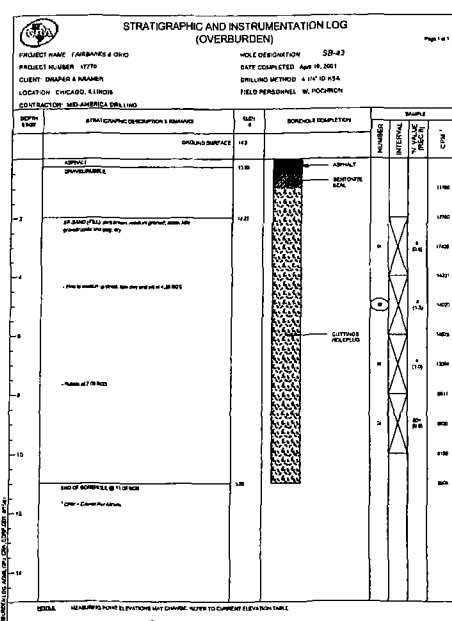
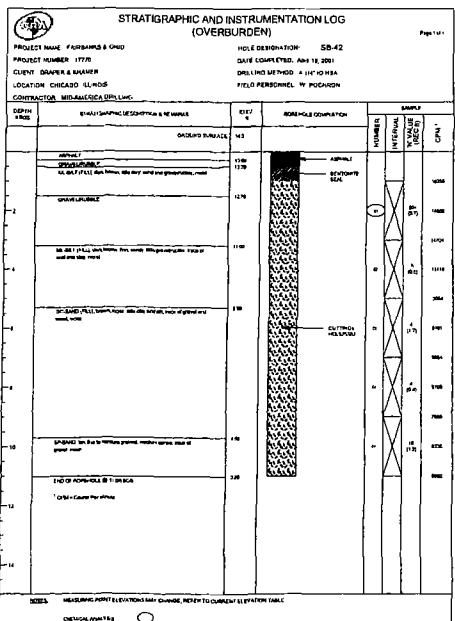
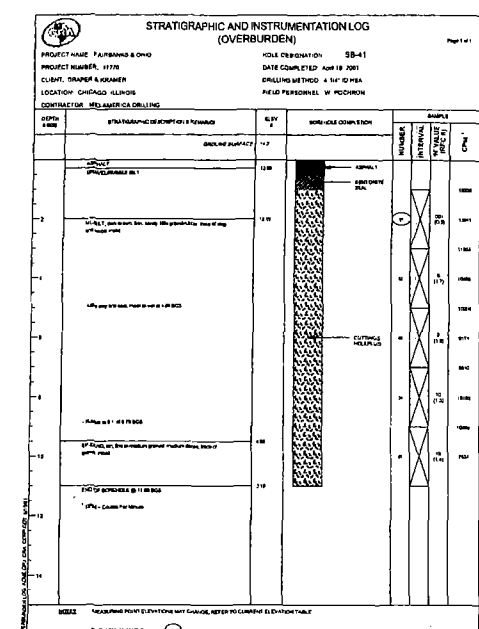
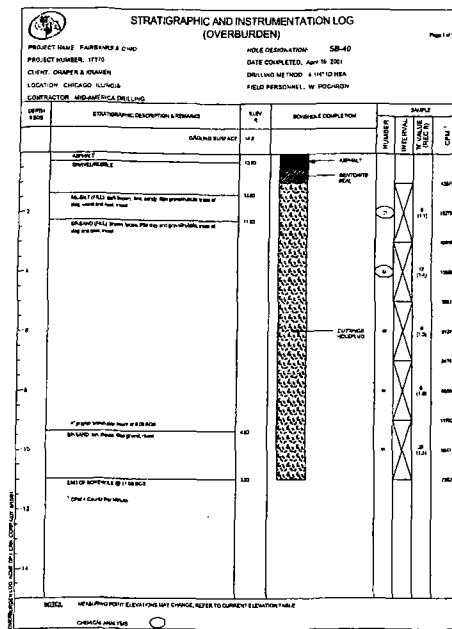
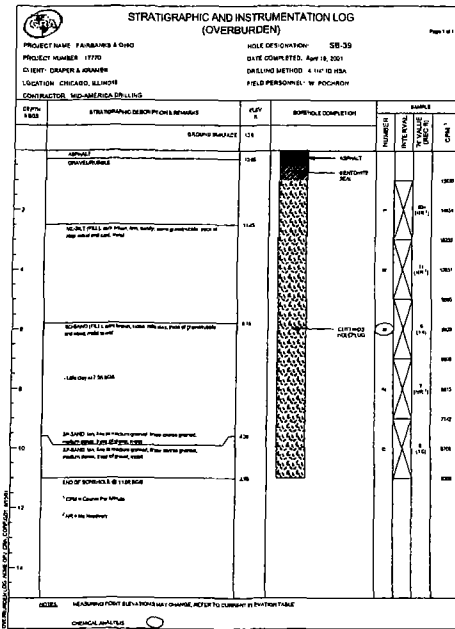
STRATIGRAPHIC CORRELATION (OVERBURDEN)

PROJECT NAME: FAIRBANKS & OHIO
 PROJECT NUMBER: 13770
 CLIENT: CHAMBER & KRAMER
 LOCATION: CHICAGO, ILLINOIS

DATE COMPLETED: April 16, 1991
 DRILLING METHOD: 1" ID 1/2" DIA
 FIELD PERSONNEL: HYPO-HORN

Geological Units and Features:

- UNIT 1 (0' to 10')**: STRATIGRAPHIC CORRELATION (OVERBURDEN)
- UNIT 2 (10' to 15')**: CHALK SURFACE
- UNIT 3 (15' to 20')**: CHALK SURFACE
- UNIT 4 (20' to 25')**: CHALK SURFACE
- UNIT 5 (25' to 30')**: CHALK SURFACE
- UNIT 6 (30' to 35')**: CHALK SURFACE
- UNIT 7 (35' to 40')**: CHALK SURFACE
- UNIT 8 (40' to 45')**: CHALK SURFACE
- UNIT 9 (45' to 50')**: CHALK SURFACE
- UNIT 10 (50' to 55')**: CHALK SURFACE
- UNIT 11 (55' to 60')**: CHALK SURFACE
- UNIT 12 (60' to 65')**: CHALK SURFACE
- UNIT 13 (65' to 70')**: CHALK SURFACE
- UNIT 14 (70' to 75')**: CHALK SURFACE
- UNIT 15 (75' to 80')**: CHALK SURFACE
- UNIT 16 (80' to 85')**: CHALK SURFACE
- UNIT 17 (85' to 90')**: CHALK SURFACE
- UNIT 18 (90' to 95')**: CHALK SURFACE
- UNIT 19 (95' to 100')**: CHALK SURFACE
- UNIT 20 (100' to 105')**: CHALK SURFACE
- UNIT 21 (105' to 110')**: CHALK SURFACE
- UNIT 22 (110' to 115')**: CHALK SURFACE
- UNIT 23 (115' to 120')**: CHALK SURFACE
- UNIT 24 (120' to 125')**: CHALK SURFACE
- UNIT 25 (125' to 130')**: CHALK SURFACE
- UNIT 26 (130' to 135')**: CHALK SURFACE
- UNIT 27 (135' to 140')**: CHALK SURFACE
- UNIT 28 (140' to 145')**: CHALK SURFACE
- UNIT 29 (145' to 150')**: CHALK SURFACE
- UNIT 30 (150' to 155')**: CHALK SURFACE
- UNIT 31 (155' to 160')**: CHALK SURFACE
- UNIT 32 (160' to 165')**: CHALK SURFACE
- UNIT 33 (165' to 170')**: CHALK SURFACE
- UNIT 34 (170' to 175')**: CHALK SURFACE
- UNIT 35 (175' to 180')**: CHALK SURFACE
- UNIT 36 (180' to 185')**: CHALK SURFACE
- UNIT 37 (185' to 190')**: CHALK SURFACE
- UNIT 38 (190' to 195')**: CHALK SURFACE
- UNIT 39 (195' to 200')**: CHALK SURFACE
- UNIT 40 (200' to 205')**: CHALK SURFACE
- UNIT 41 (205' to 210')**: CHALK SURFACE
- UNIT 42 (210' to 215')**: CHALK SURFACE
- UNIT 43 (215' to 220')**: CHALK SURFACE
- UNIT 44 (220' to 225')**: CHALK SURFACE
- UNIT 45 (225' to 230')**: CHALK SURFACE
- UNIT 46 (230' to 235')**: CHALK SURFACE
- UNIT 47 (235' to 240')**: CHALK SURFACE
- UNIT 48 (240' to 245')**: CHALK SURFACE
- UNIT 49 (245' to 250')**: CHALK SURFACE
- UNIT 50 (250' to 255')**: CHALK SURFACE
- UNIT 51 (255' to 260')**: CHALK SURFACE
- UNIT 52 (260' to 265')**: CHALK SURFACE
- UNIT 53 (265' to 270')**: CHALK SURFACE
- UNIT 54 (270' to 275')**: CHALK SURFACE
- UNIT 55 (275' to 280')**: CHALK SURFACE
- UNIT 56 (280' to 285')**: CHALK SURFACE
- UNIT 57 (285' to 290')**: CHALK SURFACE
- UNIT 58 (290' to 295')**: CHALK SURFACE
- UNIT 59 (295' to 300')**: CHALK SURFACE
- UNIT 60 (300' to 305')**: CHALK SURFACE
- UNIT 61 (305' to 310')**: CHALK SURFACE
- UNIT 62 (310' to 315')**: CHALK SURFACE
- UNIT 63 (315' to 320')**: CHALK SURFACE
- UNIT 64 (320' to 325')**: CHALK SURFACE
- UNIT 65 (325' to 330')**: CHALK SURFACE
- UNIT 66 (330' to 335')**: CHALK SURFACE
- UNIT 67 (335' to 340')**: CHALK SURFACE
- UNIT 68 (340' to 345')**: CHALK SURFACE
- UNIT 69 (345' to 350')**: CHALK SURFACE
- UNIT 70 (350' to 355')**: CHALK SURFACE
- UNIT 71 (355' to 360')**: CHALK SURFACE
- UNIT 72 (360' to 365')**: CHALK SURFACE
- UNIT 73 (365' to 370')**: CHALK SURFACE
- UNIT 74 (370' to 375')**: CHALK SURFACE
- UNIT 75 (375' to 380')**: CHALK SURFACE
- UNIT 76 (380' to 385')**: CHALK SURFACE
- UNIT 77 (385' to 390')**: CHALK SURFACE
- UNIT 78 (390' to 395')**: CHALK SURFACE
- UNIT 79 (395' to 400')**: CHALK SURFACE
- UNIT 80 (400' to 405')**: CHALK SURFACE
- UNIT 81 (405' to 410')**: CHALK SURFACE
- UNIT 82 (410' to 415')**: CHALK SURFACE
- UNIT 83 (415' to 420')**: CHALK SURFACE
- UNIT 84 (420' to 425')**: CHALK SURFACE
- UNIT 85 (425' to 430')**: CHALK SURFACE
- UNIT 86 (430' to 435')**: CHALK SURFACE
- UNIT 87 (435' to 440')**: CHALK SURFACE
- UNIT 88 (440' to 445')**: CHALK SURFACE
- UNIT 89 (445' to 450')**: CHALK SURFACE
- UNIT 90 (450' to 455')**: CHALK SURFACE
- UNIT 91 (455' to 460')**: CHALK SURFACE
- UNIT 92 (460' to 465')**: CHALK SURFACE
- UNIT 93 (465' to 470')**: CHALK SURFACE
- UNIT 94 (470' to 475')**: CHALK SURFACE
- UNIT 95 (475' to 480')**: CHALK SURFACE
- UNIT 96 (480' to 485')**: CHALK SURFACE
- UNIT 97 (485' to 490')**: CHALK SURFACE
- UNIT 98 (490' to 495')**: CHALK SURFACE
- UNIT 99 (495' to 500')**: CHALK SURFACE
- UNIT 100 (500' to 505')**: CHALK SURFACE
- UNIT 101 (505' to 510')**: CHALK SURFACE
- UNIT 102 (510' to 515')**: CHALK SURFACE
- UNIT 103 (515' to 520')**: CHALK SURFACE
- UNIT 104 (520' to 525')**: CHALK SURFACE
- UNIT 105 (525' to 530')**: CHALK SURFACE
- UNIT 106 (530' to 535')**: CHALK SURFACE
- UNIT 107 (535' to 540')**: CHALK SURFACE
- UNIT 108 (540' to 545')**: CHALK SURFACE
- UNIT 109 (545' to 550')**: CHALK SURFACE
- UNIT 110 (550' to 555')**: CHALK SURFACE
- UNIT 111 (555' to 560')**: CHALK SURFACE
- UNIT 112 (560' to 565')**: CHALK SURFACE
- UNIT 113 (565' to 570')**: CHALK SURFACE
- UNIT 114 (570' to 575')**: CHALK SURFACE
- UNIT 115 (575' to 580')**: CHALK SURFACE
- UNIT 116 (580' to 585')**: CHALK SURFACE
- UNIT 117 (585' to 590')**: CHALK SURFACE
- UNIT 118 (590' to 595')**: CHALK SURFACE
- UNIT 119 (595' to 600')**: CHALK SURFACE
- UNIT 120 (600' to 605')**: CHALK SURFACE
- UNIT 121 (605' to 610')**: CHALK SURFACE
- UNIT 122 (610' to 615')**: CHALK SURFACE
- UNIT 123 (615' to 620')**: CHALK SURFACE
- UNIT 124 (620' to 625')**: CHALK SURFACE
- UNIT 125 (625' to 630')**: CHALK SURFACE
- UNIT 126 (630' to 635')**: CHALK SURFACE
- UNIT 127 (635' to 640')**: CHALK SURFACE
- UNIT 128 (640' to 645')**: CHALK SURFACE
- UNIT 129 (645' to 650')**: CHALK SURFACE
- UNIT 130 (650' to 655')**: CHALK SURFACE
- UNIT 131 (655' to 660')**: CHALK SURFACE
- UNIT 132 (660' to 665')**: CHALK SURFACE
- UNIT 133 (665' to 670')**: CHALK SURFACE
- UNIT 134 (**




STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: PAIRWAYS & DMS
 PROJECT NUMBER: 17218
 CLIENT: CHRYSLER & POWER
 LOCATION: CHICAGO, ILL MOIS
 COORDINATION: MICHAELA TRELOAR

HOLE IDENTIFICATION: S3-48
 DATE COMPLETED: April 18, 2001
 DRILLING METHOD: 4" 114" ID HSA
 FIELD PERSONNEL: W. PUCHOSKI

DEPTH FEET	STRATIGRAPHIC DESCRIPTION & REMARKS	FLY #	STONE OR OTHER LITHO	NUMBER OF INTERVAL LOGS IN THIS SECTION	DEPTH FEET
SECONDARY DATA					
0.00	GRAVEL	110	GRAVEL	1	0.00
0.00	GRAVEL	111	GRAVEL	1	0.00
0.00	GRAVEL	112	GRAVEL	1	0.00
0.00	GRAVEL	113	GRAVEL	1	0.00
0.00	GRAVEL	114	GRAVEL	1	0.00
0.00	GRAVEL	115	GRAVEL	1	0.00
0.00	GRAVEL	116	GRAVEL	1	0.00
0.00	GRAVEL	117	GRAVEL	1	0.00
0.00	GRAVEL	118	GRAVEL	1	0.00
0.00	GRAVEL	119	GRAVEL	1	0.00
0.00	GRAVEL	120	GRAVEL	1	0.00
0.00	GRAVEL	121	GRAVEL	1	0.00
0.00	GRAVEL	122	GRAVEL	1	0.00
0.00	GRAVEL	123	GRAVEL	1	0.00
0.00	GRAVEL	124	GRAVEL	1	0.00
0.00	GRAVEL	125	GRAVEL	1	0.00
0.00	GRAVEL	126	GRAVEL	1	0.00
0.00	GRAVEL	127	GRAVEL	1	0.00
0.00	GRAVEL	128	GRAVEL	1	0.00
0.00	GRAVEL	129	GRAVEL	1	0.00
0.00	GRAVEL	130	GRAVEL	1	0.00
0.00	GRAVEL	131	GRAVEL	1	0.00
0.00	GRAVEL	132	GRAVEL	1	0.00
0.00	GRAVEL	133	GRAVEL	1	0.00
0.00	GRAVEL	134	GRAVEL	1	0.00
0.00	GRAVEL	135	GRAVEL	1	0.00
0.00	GRAVEL	136	GRAVEL	1	0.00
0.00	GRAVEL	137	GRAVEL	1	0.00
0.00	GRAVEL	138	GRAVEL	1	0.00
0.00	GRAVEL	139	GRAVEL	1	0.00
0.00	GRAVEL	140	GRAVEL	1	0.00
0.00	GRAVEL	141	GRAVEL	1	0.00
0.00	GRAVEL	142	GRAVEL	1	0.00
0.00	GRAVEL	143	GRAVEL	1	0.00
0.00	GRAVEL	144	GRAVEL	1	0.00
0.00	GRAVEL	145	GRAVEL	1	0.00
0.00	GRAVEL	146	GRAVEL	1	0.00
0.00	GRAVEL	147	GRAVEL	1	0.00
0.00	GRAVEL	148	GRAVEL	1	0.00
0.00	GRAVEL	149	GRAVEL	1	0.00
0.00	GRAVEL	150	GRAVEL	1	0.00
0.00	GRAVEL	151	GRAVEL	1	0.00
0.00	GRAVEL	152	GRAVEL	1	0.00
0.00	GRAVEL	153	GRAVEL	1	0.00
0.00	GRAVEL	154	GRAVEL	1	0.00
0.00	GRAVEL	155	GRAVEL	1	0.00
0.00	GRAVEL	156	GRAVEL	1	0.00
0.00	GRAVEL	157	GRAVEL	1	0.00
0.00	GRAVEL	158	GRAVEL	1	0.00
0.00	GRAVEL	159	GRAVEL	1	0.00
0.00	GRAVEL	160	GRAVEL	1	0.00
0.00	GRAVEL	161	GRAVEL	1	0.00
0.00	GRAVEL	162	GRAVEL	1	0.00
0.00	GRAVEL	163	GRAVEL	1	0.00
0.00	GRAVEL	164	GRAVEL	1	0.00
0.00	GRAVEL	165	GRAVEL	1	0.00
0.00	GRAVEL	166	GRAVEL	1	0.00
0.00	GRAVEL	167	GRAVEL	1	0.00
0.00	GRAVEL	168	GRAVEL	1	0.00
0.00	GRAVEL	169	GRAVEL	1	0.00
0.00	GRAVEL	170	GRAVEL	1	0.00
0.00	GRAVEL	171	GRAVEL	1	0.00
0.00	GRAVEL	172	GRAVEL	1	0.00
0.00	GRAVEL	173	GRAVEL	1	



**STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)**

Page 1 of 1

PROJECT NAME: FERNSENBANK, D-1010

PROJECT NUMBER: 17718

CLIENT: DRAPER & KRAMER

LOCATION: CHICAGO, ILLINOIS

FILE ID: 00-040101


DATE COMPLETED: Aug 30 1981

DRAWING METHOD: A 11' ID DIA



FIELD PERSONNEL: W. FROSTMAN

CONTRACTOR: MID-AMERICA DRILLING

DEPTH + FEET	BENCH MARK DESCRIPTION & SURVEY DATA	DEPTH + FEET	BOREHOLE CORRECTION	NUMBER INTERVALS	SAMPLE SUCCESSION (SHEET NO.)	DEPTH + FEET
	GROUND SURFACE	11				
2	<p>1.00' to 1.25' - 1.50' - 1.75' - 2.00' - 2.25' - 2.50' - 2.75' - 3.00' - 3.25' - 3.50' - 3.75' - 4.00' - 4.25' - 4.50' - 4.75' - 5.00' - 5.25' - 5.50' - 5.75' - 6.00' - 6.25' - 6.50' - 6.75' - 7.00' - 7.25' - 7.50' - 7.75' - 8.00' - 8.25' - 8.50' - 8.75' - 9.00' - 9.25' - 9.50' - 9.75' - 10.00' - 10.25' - 10.50' - 10.75' - 11.00'</p> <p>1.00' to 1.25' - 1.50' - 1.75' - 2.00' - 2.25' - 2.50' - 2.75' - 3.00' - 3.25' - 3.50' - 3.75' - 4.00' - 4.25' - 4.50' - 4.75' - 5.00' - 5.25' - 5.50' - 5.75' - 6.00' - 6.25' - 6.50' - 6.75' - 7.00' - 7.25' - 7.50' - 7.75' - 8.00' - 8.25' - 8.50' - 8.75' - 9.00' - 9.25' - 9.50' - 9.75' - 10.00' - 10.25' - 10.50' - 10.75' - 11.00'</p>	11.75				
4		11.82				
6		11.89				
8		11.96				
10		12.03				
12		12.10				
14		12.17				
16		12.24				
18		12.31				
20		12.38				
22		12.45				
24		12.52				
26		12.59				
28		12.66				
30		12.73				
32		12.80				
34		12.87				
36		12.94				
38		13.01				
40		13.08				
42		13.15				
44		13.22				
46		13.29				
48		13.36				
50		13.43				
52		13.50				
54		13.57				
56		13.64				
58		13.71				
60		13.78				
62		13.85				
64		13.92				
66		13.99				
68		14.06				
70		14.13				
72		14.20				
74		14.27				
76		14.34				
78		14.41				
80		14.48				
82		14.55				
84		14.62				
86		14.69				
88		14.76				
90		14.83				
92		14.90				
94		14.97				
96		15.04				
98		15.11				
100		15.18				
102		15.25				
104		15.32				
106		15.39				
108		15.46				
110		15.53				
112		15.60				
114		15.67				

 STRATIGRAPHIC AND INSTRUMENT LOG (OVERBURDEN)		DATE COMPLETED SB-50 DATE COMPLETED April 20, 1985 DRAWING NETC-001 4 11-12 HBS FIELD PERSONNEL W. POCHONIN		Project No.	
PROJECT NAME FAIRBANKS & OHIO PROJECT NUMBER 1770 CREATOR SHAWER & KUMMER LOCATION CHICAGO, ILLINOIS CONTRACTOR INDEPENDENCE SOIL LOGS		DEPTH 1880		DEPTH 0	
GROUND SURFACE 14.7		WATER TABLE DEPTH (Feet) 11.50		WATER TABLE DEPTH (Feet) 11.50	
APPROVAL DATE APPROVED (FWS) Mark Schmitt, Jr., Senior, Senior Geotechnical Engineer of Log and Soil, Inc.		APPROVAL DATE APPROVED (FWS) Mark Schmitt, Jr., Senior, Senior Geotechnical Engineer of Log and Soil, Inc.		APPROVAL DATE APPROVED (FWS) Mark Schmitt, Jr., Senior, Senior Geotechnical Engineer of Log and Soil, Inc.	
1880 1870 1860 1850 1840 1830 1820 1810 1800 1790 1780 1770 1760 1750 1740 1730 1720 1710 1700 1690 1680 1670 1660 1650 1640 1630 1620 1610 1600 1590 1580 1570 1560 1550 1540 1530 1520 1510 1500 1490 1480 1470 1460 1450 1440 1430 1420 1410 1400 1390 1380 1370 1360 1350 1340 1330 1320 1310 1300 1290 1280 1270 1260 1250 1240 1230 1220 1210 1200 1190 1180 1170 1160 1150 1140 1130 1120 1110 1100 1090 1080 1070 1060 1050 1040 1030 1020 1010 1000 990 980 970 960 950 940 930 920 910 900 890 880 870 860 850 840 830 820 810 800 790 780 770 760 750 740 730 720 710 700 690 680 670 660 650 640 630 620 610 600 590 580 570 560 550 540 530 520 510 500 490 480 470 460 450 440 430 420 410 400 390 380 370 360 350 340 330 320 310 300 290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0		1880 1870 1860 1850 1840 1830 1820 1810 1800 1790 1780 1770 1760 1750 1740 1730 1720 1710 1700 1690 1680 1670 1660 1650 1640 1630 1620 1610 1600 1590 1580 1570 1560 1550 1540 1530 1520 1510 1500 1490 1480 1470 1460 1450 1440 1430 1420 1410 1400 1390 1380 1370 1360 1350 1340 1330 1320 1310 1300 1290 1280 1270 1260 1250 1240 1230 1220 1210 1200 1190 1180 1170 1160 1150 1140 1130 1120 1110 1100 1090 1080 1070 1060 1050 1040 1030 1020 1010 1000 990 980 970 960 950 			

[illegible]

		STRATIGRAPHIC AND INSTRUMENT LOG (OVERBURDEN)			Page	
PROJECT NAME: FAIRBANKS & COWD		HOLE DESCRIPTION: SD-59				
PROJECT NUMBER: 1775		DATE COMPLETED: Apr. 26, 1961				
LOGIC: CHAMBER & KRAUER		DRILLING METHOD: A 14" ID HSA				
LOCATION: CHICAGO, ILLINOIS		FIELD PERSONNEL: W. KUCHEN				
CONTINUATION: 140-AMERICA DRILL LOG						
DEPTH (FEET)	STRATIGRAPHIC DESCRIPTION AND REMARKS	DEPTH (FEET)	INTERVALS & SAMPLES	NUMBER	INTERVAL	SAMPLE NUMBER
	OVERBURDEN SURFACE	1.17				
0	TOPSOIL OVERLYNABLE	1.12				
2						
4	3 1/2" THICK STILL AND STONE TOP GRANITE MOUNTAIN ROCK BBS TOP AND GRANULITE, TOP OF MOUNTAIN ROCK, MOUNTAIN	16.71				
6						
8	Working at 20, 25, 30, 35					
10						
12	1/4" of granitic, 1/2" of sil. and 1/4" of sil. (S.G.)					
14						
16						
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On February 9, three soil samples were collected from one borehole located in the vicinity of the highest surface radiation levels. 59 samples were collected between April 16-20. For each sample, a 500 ml Marinelli beaker was filled with soil collected by CRA personnel. All samples were counted for 1 hour on a high-resolution gamma spectroscopy system.

MAY 7, 2001

The samples were analyzed using GDR software for the uranium, thorium and actinium series and potassium-40. Radium 226 from the thorium series emits no significant photons. Radium 226 from the uranium series has only one significant photon at 186 keV and its abundance is slightly greater than 0.03. These properties make identification of these isotopes of radium unlikely in practical situations.

The concentrations of surrogates with more abundant high energy photons usually represent the concentration of Ra-226 and Ra-226. Actinium-228, in the thorium series, is frequently used as a surrogate for Radium-226, and Lead-214, in the uranium series, is frequently used as a surrogate for Radium-226. These surrogates are in equilibrium with the radium isotopes after one month in situ.

II. RESULTS

Surface radiation level survey results

The background radiation level with the Ludlum 193 and the 2-inch by 2-inch sodium iodide detector was 2,000 counts per minute (cpm). Several areas on the site had radiation levels significantly above background. The most elevated areas were along the western edge of the property. The highest reading was 8,500 cpm, measured between areas D13 and E13. The measurement was approximately 41 feet from the south sidewalk and approximately 19 feet from the brick wall.

Down-hole Results

The February 9, down-hole measurements were made with the 1-inch by 1-inch detector and the Ludlum 2241 at two locations, B3 and G8. The results of these measurements are summarized in Table 2 of a report dated February 19, 2001, and are incorporated in this report in Appendix B. Bore-hole G8 readings could not be made at the surface and one and two foot depths because a heavy rain interfered with equipment performance.

The results from the April 16-20 down-hole measurements are in Appendix B. The highest reading, 2,239,317 cpm, was recorded in the bore-hole designated SB-11 at a depth of 2 ft.

Soil Analysis Results

The high-resolution gamma spectroscopy analyses of the boring samples are provided in Appendix C. Ac-228 and Pb-214 are surrogates for Ra-226 and Ra-226, respectively. The highest concentration of Ac-228 plus Pb-214 was 2500 pCi/g in a sample collected from bore-hole SB11. The sample was collected from a depth of approximately 1 ft. This concentration represents the sum of concentrations of Ra-226 and Ra-226.

Several parameters are set in the GDR software before analysis. Sensitivity discriminates against statistically poor peaks. The lower the search sensitivity, the smaller and less defined the peak can be and still be recognized. The range for sensitivity is from 0 to 10. The manufacturer's default value of 2 was used. Low energy cutoff sets the value below which energies will not be considered in the peak search routine. The low energy cutoff was set to 30 keV. The library window is the tolerance in keV used to determine if a peak energy is a close enough match to a library energy to identify the peak for activity reporting. The manufacturer's default value of 2 keV was used. The final parameter is the gamma fraction limit (%). This value, ranging from 0 to 100, sets the specified fraction of known secondary peaks that must be present in the spectrum. The gamma fraction limit was set to 10%. The efficiency and library files used in the analysis are in Appendix D.

III. CONCLUSIONS

The results of the surface survey show evidence of concentrations of radioactivity above normal background levels at a number of locations. This conclusion is supported by down-hole measurements, which are significantly elevated above levels usually attributed to naturally occurring radioactive material or rubble in the soil.

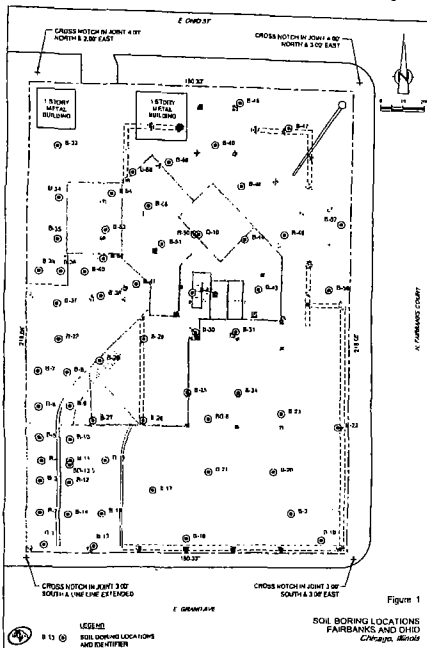
The EPA has applied an action level in the Streesterville area of a total of 7.1 pCi/g Ra-226 plus Ra-228. Eight samples out of 59 samples had concentrations of radium-226 and radium-228 surrogates in excess of the EPA's action level of 7.1 pCi/g.

APPENDIX B

Note: Bolded values represent the highest recorded radiation reading in each bore-hole.

Down Hole Measurement Results Reported February 19, 2001

Depth	Bore B3 (cts in 1 min)	Bore G8 (cts in 1 min)
1 ft	4019	-
2 ft	4378	-
3 ft	3504	3948
4 ft	3487	3494
5 ft	2418	2523
6 ft	2070	2421
7 ft	1946	2285
8 ft	2020	1769
9 ft	1924	1692
10 ft	1513	1633
11 ft	1667	1559



APPENDIX B (continued)

Down Hole Results Recorded April 16-20, 2001	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	SB-9	SB-10	SB-11
1	34006	32363	12623	5227	12565	16602	1457	21965	31193	24389	501777
2	30989	33106	21075	67398	24572	21123	7481	3748	54713	48862	2233317
3	43720	35874	35874	15242	24467	24606	3032	50724	134706	40166	1755505
4	40758	63646	40707	55556	17556	31776	34619	62107	127091	42862	2266023
5	29006	80748	21081	65725	154010	47526	73889	51624	270918	36243	160570
6	18884	38141	19815	155556	44607	29322	34665	36237	21362	17704	17164
7	8724	10762	13615	155556	44607	29322	34665	36237	21362	17704	17164
8	8724	10762	13615	155556	44607	29322	34665	36237	21362	17704	17164
9	8724	10762	13615	155556	44607	29322	34665	36237	21362	17704	17164
10	8724	10762	13615	155556	44607	29322	34665	36237	21362	17704	17164
11	8724	10762	13615	155556	44607	29322	34665	36237	21362	17704	17164
12	7340	9461	7192	12441	10508	10779	10779	10779	10779	10779	10779

(u) (u) (u) (u) (u) (u) (u) (u) (u) (u) (u) (u)

APPENDIX B (continued)

	SB-12	SB-13	SB-14	SB-15	SB-16	SB-17	SB-18	SB-19	SB-20	SB-21	SB-22	SB-23
1	3062	3121	14366	15311	14261	18156	17901	17437	13761	18463	17502	17944
2	6424	49254	234427	17648	14256	18056	17061	12960	13761	18463	17502	17944
3	7187	4502	102234	16880	14168	18056	17061	12960	13761	18463	17502	17944
4	135784	38411	185120	15569	11026	9373	9411	12127	8302	10775	10474	10038
5	65487	38411	62611	11046	8552	9271	8248	8779	8666	8122	8232	8315
6	11172	13855	1368	1368	1368	1368	1368	1368	1368	1368	1368	1368
7	6984	307	8355	1092	6832	6791	7506	6738	8033	6664	7746	8714
8	10274	8750	17821	8536	6395	6719	6825	6711	7081	6834	6914	6554
9	6719	7822	17821	8536	6395	6719	6825	6711	7081	6834	6914	6554
10	6719	7822	17821	8536	6395	6719	6825	6711	7081	6834	6914	6554
11	6719	7822	17821	8536	6395	6719	6825	6711	7081	6834	6914	6554
12	6719	7822	17821	8536	6395	6719	6825	6711	7081	6834	6914	6554
13	6719	7822	17821	8536	6395	6719	6825	6711	7081	6834	6914	6554

APPENDIX B (continued)

	SB-48	SB-49	SB-50	SB-51	SB-52	SB-53	SB-54	SB-55	SB-56	SB-57	SB-58	SB-59
1	15417	14168	14602	14910	17613	18333	14418	16687	19390	19773	17789	15289
2	17625	13382	13692	17787	18333	18333	18333	18333	18333	18333	18333	18333
3	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572
4	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572
5	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572
6	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572
7	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572
8	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572
9	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572
10	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572
11	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572
12	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572
13	13643	10389	12572	12572	12572	12572	12572	12572	12572	12572	12572	12572

APPENDIX B (continued)

	SB-24	SB-25	SB-26	SB-27	SB-28	SB-29	SB-30	SB-31	SB-32	SB-33	SB-34	SB-35
1	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
2	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
3	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
4	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
5	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
6	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
7	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
8	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
9	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
10	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
11	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
12	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372
13	14738	17856	18372	24443	18372	18372	18372	18372	18372	18372	18372	18372

APPENDIX C

Gamma Spectroscopy Results

Sample no.	Borehole ID	Depth R	Ac-228 pCi/g	Pb-214 pCi/g	TOTAL pCi/g
011294	SB-1	1-3	0.00E+00	2.00E+00	2.00E+00
011295	SB-1	7-9	0.00E+00	3.00E+00	3.00E+00
011296	SB-2	1-3	0.00E+00	1.98E+00	1.98E+00
011297	SB-2	5-7	1.80E+00	2.54E+00	4.34E+00
011298	SB-3	3-5	7.29E-01	1.36E+00	2.09E+00
011299	SB-3	7-9	2.87E-01	4.60E-01	7.47E-01
011300	SB-4	1-3	1.08E+00	2.13E+00	3.18E+00
011301	SB-4	5-7	1.07E+02	3.88E+01	1.43E+02
011302	SB-4	9-11	9.48E-01	7.93E-01	1.74E+00
011303	SB-5	5-7	2.58E+00	4.47E+00	7.03E+00
011304	SB-5	9-11	0.00E+00	6.87E-01	6.87E-01
011305	SB-6	1-3	0.00E+00	3.24E+00	4.92E+00
011306	SB-6	5-7	9.19E-01	2.79E+00	3.65E+00
011307	SB-7	7-9	4.74E-01	1.25E+00	1.72E+00
011308	SB-8	7-9	0.00E+00	1.51E+00	1.51E+00
011309	SB-8	9-11	2.92E+00	4.87E+00	7.79E+00
011310	SB-9	5-7	9.89E+01	1.40E+02	2.39E+02
011311	SB-10	3-5	8.87E-01	1.15E+00	2.10E+00
011312	SB-10	7-9	0.00E+00	7.87E-01	7.87E-01
011313	SB-11	1-3	1.21E+00	1.29E+00	2.50E+00
011314	SB-11	7-9	6.83E+00	2.77E+00	9.19E+00
011315	SB-11	9-11	1.56E+00	4.67E-01	2.03E+00
011316	SB-12	1-3	1.12E+00	1.59E+00	2.72E+00
011317	SB-12	3-5	2.38E+00	5.72E+00	8.10E+00
011318	SB-13	3-5	1.94E+00	2.22E+00	4.16E+00
011319	SB-14	1-3	5.17E+01	8.88E+00	6.06E+01
011320	SB-14	3-5	7.35E+00	1.77E+00	9.12E+00
011321	SB-15	1-3	1.33E+00	1.24E+00	2.57E+00
011322	SB-16	3-5	4.91E-01	5.17E-01	1.01E+00
011323	SB-17	3-5	4.08E-01	6.80E-01	1.08E+00
011324	SB-18	1-3	0.00E+00	1.02E+00	1.02E+00
011325	SB-19	3-5	1.22E+00	1.51E+00	2.83E+00
011326	SB-20	3-5	4.41E-01	6.92E-01	1.02E+00
011327	SB-21	3-5	6.94E-01	6.22E-01	1.26E+00
011328	SB-22	3-6	0.00E+00	9.19E-01	9.19E-01
011329	SB-23	1-3	6.93E-01	9.65E-01	1.62E+00
011330	SB-24	1-3	7.40E-01	1.00E+00	1.74E+00
011331	SB-24	5-7	0.00E+00	6.29E-01	6.29E-01
011332	SB-25	2-4	8.84E-01	1.10E+00	1.78E+00
011333	SB-26	2-4	9.28E-01	2.00E+00	3.02E+00
011334	SB-27	4-6	0.00E+00	1.00E+00	1.00E+00
011335	SB-27	2-4	1.81E+00	3.27E+00	5.08E+00
011336	SB-27	4-6	1.54E+00	3.24E+00	4.78E+00
011337	SB-27	8-10	4.77E-01	8.98E-01	1.36E+00
011338	SB-28	1-3	8.91E-01	2.47E+00	3.36E+00

APPENDIX C (continued)

011342	SB-28	7-9	0.00E+00	1.19E+00	1.19E+00
011343	SB-29	1-3	7.38E-01	1.18E+00	1.92E+00
011344	SB-29	5-7	0.00E+00	1.56E+00	1.56E+00
011345	SB-30	1-3	9.76E-01	1.85E+00	2.83E+00
011346	SB-30	5-7	4.41E-01	1.15E+00	1.59E+00
011347	SB-31	1-3	9.52E-01	2.22E+00	3.17E+00
011348	SB-31	7-9	7.27E-01	1.23E+00	1.95E+00
011349	SB-33	1-3	1.02E+00	2.61E+00	3.63E+00
011350	SB-33	5-7	0.00E+00	1.68E+00	1.68E+00
011351	SB-34	1-3	9.57E-01	2.81E+00	3.77E+00
011352	SB-34	5-7	0.00E+00	1.38E+00	1.38E+00
011353	SB-35	3-5	9.31E-01	2.24E+00	3.17E+00
011354	SB-36	1-3	0.00E+00	2.59E+00	2.59E+00
011355	SB-37	5-7	0.00E+00	8.80E-01	8.80E-01
011356	SB-37	9-11	1.83E+00	5.50E+00	7.33E+00
011357	SB-38	3-5	6.78E-01	1.97E+00	2.65E+00
011358	SB-38	5-7	9.04E-01	2.81E+00	3.71E+00
011359	SB-39	5-7	0.00E+00	1.98E+00	1.98E+00
011360	SB-39	9-11	8.74E-01	2.28E+00	3.15E+00
011361	SB-40	1-3	1.54E+01	1.69E+01	3.23E+01
011362	SB-40	3-5	4.78E-01	1.82E+00	2.10E+00
011363	SB-41	1-3	8.74E-01	2.28E+00	3.15E+00
011364	SB-42	1-3	7.48E-01	2.25E+00	3.00E+00
011365	SB-43	3-5	5.56E-01	1.09E+00	1.64E+00
011366	SB-44	3-5	7.09E-01	2.44E+00	3.15E+00
011367	SB-45	6-8	0.00E+00	1.05E+00	1.05E+00
011368	SB-46	3-5	7.68E-01	2.20E+00	2.97E+00
011369	SB-47	1-3	9.51E-01	2.08E+00	3.03E+00
011370	SB-48	3-5	1.17E+00	1.91E+00	3.07E+00
011371	SB-49	5-7	6.07E-01	1.23E+00	1.84E+00
011372	SB-50	4-6	9.00E-01	2.41E+00	3.31E+00
011373	SB-51	2-4	5.38E-01	1.84E+00	2.38E+00
011374	SB-52	1-3	0.00E+00	2.39E+00	2.39E+00
011375	SB-53	7-9	0.00E+00	1.55E+00	1.55E+00
011376	SB-54	1-3	6.86E-01	3.53E+00	4.38E+00
011377	SB-54	5-7	0.00E+00	1.11E+00	1.11E+00
011378	SB-55	1-3	8.37E-01	3.04E+00	3.88E+00
011379	SB-55	5-7	0.00E+00	8.93E-01	8.93E-01
011380	SB-56	1-3	1.48E+00	2.80E+00	4.28E+00
011381	SB-57	1-3	7.00E-01	1.99E+00	2.69E+00
011382	SB-58	5-7	1.05E+00	3.01E+00	4.06E+00
011383	SB-59	3-5	0.00E+00	9.70E-01	9.70E-01
011384	SB	1-3	6.04E-01	2.50E+00	3.10E+00
011385	SB	3-5	6.52E-01	3.32E+00	3.98E+00

* Bolded Values exceed

APPENDIX D

Efficiency and Library Files Used in Gamma Spec Analysis

EFFICIENCY FILE: h:\gdr\eff\gamma00mar.eff

ID: - 500 ml Maxwell

EFF: -1/(7.31e-002*E**3.40e+000 - 7.85e+001*E**0.95e+001)

(Where E = Energy in MeV)

Library file: h:\gdr\lib\USPack.lib

ID: U, Th, & Ac Natural Series - K

Pk #	Energy (keV)	Isotope Name	Zndary	Gamma Fraction	Half-life	DAC (uCi/ali)	Calc Sbr	Chtr Cntr
1	11.70	Ra-223	19	1.0	0.2474 1.143e+001 D	3.0e-010	Y	Y
2	22.10	Po-223	7	1.0	0.3168 2.180e+001 M	1.0e-007	Y	Y
3	11.00	U-235	25	1.0	0.3910 7.030e+008 Y	2.0e-011	Y	Y
4	27.16	Pa-231	24	QUANT	0.0920 3.276e+008 Y	6.0e-013	Y	Y
5	46.50	Pb-210	8	QUANT	0.0405 2.246e+001 Y	1.0e-010	Y	Y
6	50.10	Th-227	48	QUANT	0.0840 1.871e+001 D	1.0e-010	Y	Y
7	56.10	Fr-223	18	QUANT	0.1170 2.180e+001 M	3.0e-007	Y	Y
8	51.20	U-234	9	QUANT	0.8912 3.455e+005 Y	2.0e-011	Y	Y
9	54.00	Th-232	35	QUANT	0.0019 1.405e+010 Y	5.0e-013	Y	Y
10	61.29	Th-234	27	QUANT	0.0381 2.410e+001 D	6.0e-008	Y	Y
11	66.10	U-238	9	QUANT	0.0010 4.460e+009 Y	2.0e-011	Y	Y
12	67.47	Th-230	9	QUANT	0.0037 7.700e+004 Y	3.0e-012	Y	Y
13	74.82	Pb-212	17	QUANT	0.1509 1.064e+001 H	1.0e-008	Y	Y
14	74.82	Pb-214	16	QUANT	0.0621 2.680e+001 M	3.0e-007	Y	Y
15	74.97	Tl-208	56	QUANT	0.0343 1.033e+000 M	0.0e+000	Y	Y
16	77.11	Pb-214	23	QUANT	0.1046 2.480e+001 M	2.0e-007	Y	Y
17	77.11	Pb-212	22	QUANT	0.1800 1.064e+001 H	1.0e-008	Y	Y
18	79.60	Fr-223	24	QUANT	0.0761 2.180e+001 M	3.0e-007	Y	Y
19	83.78	Sa-223	31	QUANT	0.2470 1.143e+001 D	3.0e-010	Y	Y
20	84.21	Th-231	9	QUANT	0.0644 2.550e+001 H	3.0e-008	Y	Y
21	84.37	Th-228	16	QUANT	0.0131 1.812e+000 Y	4.0e-012	Y	Y
22	87.10	Pb-212	49	QUANT	0.0804 1.064e+001 H	1.0e-008	Y	Y
23	87.10	Pb-214	51	QUANT	0.0467 2.680e+001 M	3.0e-007	Y	Y
24	88.47	Fr-223	47	QUANT	0.0242 2.180e+001 M	3.0e-007	Y	Y
25	89.15	U-235	29	QUANT	0.0373 7.030e+008 Y	2.0e-011	Y	Y
26	90.88	Pa-231	41	QUANT	0.0102 3.276e+008 Y	6.0e-013	Y	Y
27	92.38	Th-234	28	QUANT	0.0272 2.410e+001 D	6.0e-008	Y	Y
28	92.90	Th-234	10	QUANT	0.0269 2.410e+001 D	6.0e-008	Y	Y
29	93.25	U-238	37	QUANT	0.0446 7.030e+008 Y	2.0e-011	Y	Y
30	94.46	Pa-234	32	QUANT	0.1510 6.700e+000 H	3.0e-006	Y	Y
31	94.90	Ra-223	38	QUANT	0.1120 1.143e+001 D	3.0e-010	Y	Y
32	96.44	Pa-214	13	QUANT	0.2514 6.700e+000 H	3.0e-006	Y	Y
33	111.00	Pa-214	16	QUANT	0.1185 6.700e+000 H	3.0e-006	Y	Y
34	115.18	Ac-227	0	QUANT	0.0010 2.177e+001 Y	2.0e-013	Y	Y
35	125.00	Th-232	9	QUANT	0.0004 1.405e+010 Y	5.0e-013	Y	Y

APPENDIX D

CONSTRUCTION QUALITY ASSURANCE PLAN

APPENDIX D (continued)

36	131.20	Pa-214	55	QUANT	0.2040 6.700e+000 H	3.0e-006	Y	Y
37	143.76	U-235	40	QUANT	0.1050 7.030e+008 Y	2.0e-011	Y	Y
38	144.24	Ra-223	19	QUANT	0.0281 1.143e+001 D	3.0e-010	Y	Y
39	154.23	Ra-223	32	QUANT	0.0554 1.143e+001 D	3.0e-010	Y	Y
40	163.16	U-235	42	QUANT	0.0407 7.030e+008 Y	2.0e-011	Y	Y
41	165.12	Pa-231	59	QUANT	0.0142 3.276e+008 Y	6.0e-013	Y	Y
42	165.72	U-235	44	QUANT	0.1400 7.030e+008 Y	3.0e-011	Y	Y
43	186.21	Ra-226	0	1.0	0.0374 1.405e+001 Y	3.0e-010	Y	Y
44	205.11	U-235	3	QUANT	0.0470 7.030e+008 Y	2.0e-011	Y	Y
45	209.28	Ac-228	13	QUANT	0.0441 6.700e+000 H	4.0e-009	Y	Y
46	215.18	Th-228	21	QUANT	0.0024 1.812e+000 Y	4.0e-012	Y	Y
47	234.90	Fr-223	2	QUANT	0.0282 2.180e+001 M	3.0e-007	Y	Y
48	236.00	Th-227	6	QUANT	0.1350 1.871e+001 D	1.0e-010	Y	Y
49	238.43	Pb-212	40	QUANT	0.0463 1.064e+001 H	1.0e-008	Y	Y
50	240.38	Ra-224	0	QUANT	0.0395 1.405e+001 D	7.0e-010	Y	Y
51	241.98	Pb-214	17	QUANT	0.0749 2.680e+001 M	3.0e-007	Y	Y
52	249.46	Ra-223	62	QUANT	0.1360 1.143e+001 D	3.0e-010	Y	Y
53	270.23	Ac-228	63	QUANT	0.0360 6.700e+000 H	4.0e-009	Y	Y
54	271.23	Rb-219	69	QUANT	0.0100 1.945e+000 M	0.0e+000	Y	Y
55	272.10	Pa-214	65	QUANT	0.0102 6.700e+000 M	3.0e-006	Y	Y
56	277.35	Tl-208	75	QUANT	0.0679 3.053e+000 M	0.0e+000	Y	Y
57	285.21	Pb-214	48	QUANT	0.1202 2.680e+001 M	3.0e-007	Y	Y
58	298.00	Tl-210	86	QUANT	0.7917 1.300e+000 M	0.0e+000	Y	Y
59	308.08	Pa-231	61	QUANT	0.0330 3.276e+008 Y	6.0e-013	Y	Y
60	380.09	Pb-212	13	QUANT	0.0341 1.064e+001 H	1.0e-008	Y	Y
61	392.67	Pa-231	4	QUANT	0.0230 3.276e+008 Y	6.0e-013	Y	Y
62	393.87	Ra-223	1	QUANT	0.0383 1.143e+001 D	3.0e-010	Y	Y
63	327.44	Ac-228	66	QUANT	0.0321 6.700e+000 H	4.0e-009	Y	Y
64	327.96	Bi-212	81	QUANT	0.0031 6.055e+001 M	1.0e-007	Y	Y
65	328.00	Pa-234	74	QUANT	0.0031 6.700e+000 H	1.0e-006	Y	Y
66	328.32	Ac-228	71	QUANT	0.1134 6.700e+000 M	4.0e-009	Y	Y
67	381.07	Bi-212	5	QUANT	0.1234 3.130e+000 M	0.0e+000	Y	Y
68	351.93	Pb-214	14	QUANT	0.1721 2.680e+001 M	3.0e-007	Y	Y
69	401.81	Rn-219	54	QUANT	0.0050 3.940e+000 S	0.0e+000	Y	Y
70	404.84	Pb-213	12	QUANT	0.0291 3.410e+001 M	1.0e-007	Y	Y
71	409.51	Ac-228	74	QUANT	0.0311 6.700e+000 H	4.0e-009	Y	Y
72	427.08	Pb-213	89	QUANT	0.0235 3.410e+001 M	3.0e-007	Y	Y
73	438.70	Po-215	0	QUANT	0.0057 7.780e+004 S	0.0e+000	Y	Y
74	443.00	Ac-228	84	QUANT	0.0443 6.700e+000 H	4.0e-009	Y	Y
75	510.84	Tl-208	78	QUANT	0.2156 3.053e+000 M	0.0e+000	Y	Y
76	569.58	Pa-234	80	QUANT	0.1091 6.700e+000 H	3.0e-006	Y	Y
77	569.67	Po-211	59	QUANT	0.0054 5.160e+001 S	0.0e+000	Y	Y
78	583.14	Tl-208	90	QUANT	0.1623 3.053e+000 M	0.0e+000	Y	Y
79	609.31	Bi-214	87	QUANT	0.4528 1.990e+001 M	3.0e-007	Y	Y
80	660.80	Pa-234	83	QUANT	0.0053 6.700e+000 H	3.0e-006	Y	Y
81	727.17	Bi-212	64	QUANT	0.1187 6.055e+001 M	1.0e-007	Y	Y
82	748.36	Bi-214	98	QUANT	0.0504 1.990e+001 M	3.0e-007	Y	Y
83	769.70	Pa-214	51	QUANT	0.0057 6.700e+000 H	3.0e-006	Y	Y
84	794.70	Ac-228	95	QUANT	0.0464 6.700e+000 H	4.0e-009	Y	Y
85	797.30	Po-214	0	QUANT	0.0031 6.700e+000 S	0.0e+000	Y	Y
86	799.70	Tl-210	104	QUANT	0.0884 1.300e+000 M	0.0e+000	Y	Y
87	803.10	Po-210	0	QUANT	0.0080 1.393e+002 D	3.0e-010	Y	Y
88	804.90	Pa-234	6	QUANT	0.0097 1.460e+001 S	0.0e+000	Y	Y
89	831.94	Pb-213	70	QUANT	0.0286 3.410e+001 M	3.0e-007	Y	Y
90	860.37	Tl-208	15	QUANT	0.1245 3.053e+000 M	0.0e+000	Y	Y
91	880.31	Pa-214	92	QUANT	0.1224 6.700e+000 H	3.0e-006	Y	Y

APPENDIX D (continued)

92	883.24	Pa-234	96	QUANT	0.1224 6.700e+000 H	3.0e-006	Y	Y
93	897.83	Po-211	77	QUANT	0.0052 5.160e+001 S	0.0e+000	Y	Y
94	897.83	Tl-207	0	QUANT	0.0024 4.770e+000 M	0.0e+000	Y	Y
95	931.07	Ac-228	100	QUANT	0.2170 6.700e+000 H	4.0e-009	Y	Y
96	926.00	Pa-234	99	QUANT	0.1122 6.700e+000 H	3.0e-006	Y	Y
97	926.18	Pa-234m	102	QUANT	0.0037 1.170e+000 M	0.0e+000	Y	Y
98	934.06	Bi-214	103	QUANT	0.0121 1.990e+001 M	3.0e-007	Y	Y
99	946.00	Pa-234	105	QUANT	0.1224 6.700e+000 H	3.0e-006	Y	Y
100	964.40	Ac-238	101	QUANT	0.0021 6.700e+000 H	4.0e-009	Y	Y
101	969.31	Ac-228	45	QUANT	0.1662 6.700e+000 H	4.0e-009	Y	Y
102	1001.00	Pa-234m	97	QUANT	0.0039 1.170e+000 M	0.0e+000	Y	Y
103	1120.30	Bi-214	104	QUANT	0.1315 1.990e+001 M	3.0e-007	Y	Y
104	1128.10	Bi-214	107	QUANT	0.0594 1.990e+001 M	3.0e-007	Y	Y
105	1240.50	Pa-214	30	QUANT	0.0051 4.700e+000 M	3.0e-006	Y	Y
106	1310.00	Tl-210	58	QUANT	0.2076 1.300e+000 M	0.0e+000	Y	Y
107	1377.70	Bi-214	108	QUANT	0.0411 1.990e+001 M	3.0e-007	Y	Y
108	1460.80	K-40	0	QUANT	0.1561 1.277e+008 Y	2.0e-007	Y	Y
109	1764.50	Bi-214	79	QUANT	0.1584 1.990e+001 M	3.0e-007	Y	Y

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LIST OF FIGURES

(Following Report)

FIGURE D-3.1 PROJECT ORGANIZATION

LIST OF TABLES

TABLE D-6.1 SUMMARY OF CONSTRUCTION QUALITY ASSURANCE INSPECTIONS AND TESTING

ATTACHMENT D.A TYPICAL CONTRACTORS DAILY CONSTRUCTION REPORT

Glossary

CQA	Construction Quality Assurance
CQAP	Construction Quality Assurance Project Plan
HS	Health and Safety
HASP	Health and Safety Plan
IEMA	Illinois Emergency Management Agency
OSHA	Occupational Safety and Health Administration
QA	Quality Assurance
QC	Quality Control
RA	Removal Action
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) has prepared this Construction Quality Assurance Plan (CQAP) for the property referred to as the Fairbanks and Olin Autopark, Chicago, Illinois (Site). The Site is currently occupied by an active pay parking lot, a fast food restaurant and a vacant metal building.

The activities outlined in the Removal Action Work Plan (RAWP) involve excavation and off-site disposal of radiologically-impacted soil/fill material from beneath the Site. The excavated area will be backfilled as required to facilitate future use of the Site. Remediation of the Site is being undertaken in support of planned redevelopment including construction of a high-rise, multi-use building. The remediation program is being undertaken on a voluntary basis under agreement with the United States Environmental Protection Agency (U.S.EPA).

1.1 PURPOSE AND ORGANIZATION OF REPORT

This CQAP presents the quality assurance program to be used during implementation of the Removal Action (RA) at the Site. The purpose of the CQAP is to ensure that the RA activities meet or exceed all design criteria and requirements.

This CQAP is organized as follows:

- i) Section 1.0 presents the background information, purpose and organization of the report.
- ii) Section 2.0 provides a description of the project.
- iii) Section 3.0 outlines the project organization and responsibilities.
- iv) Section 4.0 presents the personnel qualification requirements.
- v) Section 5.0 presents the project meeting requirements.
- vi) Section 6.0 describes the inspection and testing activities required to ensure that construction and materials comply with all design specifications and plans; and
- vii) Section 7.0 describes the documentation requirements of the Construction Quality Assurance (CQA) activities.

2.0 PROJECT DESCRIPTION

The remediation activities will be focused on the removal of radiologically-impacted soil/fill material. It is expected that the excavation will extend through the complete thickness of the fill material over the entire Site area. The excavation may also extend into the underlying native material depending on the results of verification testing to be performed.

The general sequence of activities will be as follows:

- preparatory work, including obtaining required permits and approvals, and utility clearance;
- mobilization of materials, equipment and temporary support facilities;
- site surveying, closing existing structures and fence removal;
- removal of asphalt, and walkover survey for presence of impacted soil / fill;
- sheeting / shoring and excavation, staging and removal of impacted soil / fill to required depth;
- confirmatory soil sampling and analysis;
- backfilling and Site restoration; and
- project closeout.

This CQAP applies to the activities associated with soil excavation and associated testing.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

Figure 13.3.1 shows the Project Organizational Chart including Quality Assurance (QA) and Quality Control (QC). Duties and responsibilities including QA and QC are listed below.

3.1 PROJECT MANAGER

- Serves as the Owner's Representative.
- Acts as primary contact with agency personnel.

3.2 PROJECT COORDINATOR

- Provides assistance to Project Manager.
- Provides overall project coordination function.
- Assures adherence to work plan requirements.
- Acts as primary contact with project personnel and RA Contractor.

3.3 PROJECT ENGINEER

- Provides day-to-day construction management/liaison with RA Contractor.
- Provides engineering and other technical support during construction.
- Assures adherence to contracts and schedules.
- Coordinates QA and construction work.
- Maintains job record and reviews submittal and schedules.
- Reviews work performed and disapproves defective work.
- Conducts pre-final and final inspections of completed work.
- Prepares as-built drawings.
- Conducts meetings as required.
- Verifies quantities of materials used.

3.4 SITE ENGINEER / CQA OFFICER

- Reports to the Project Engineer.
- Executes the approved CQAP.
- Provides field management of CQA activities.
- Provides day-to-day liaison with radiological laboratory and Health Physics Contractor.
- Performs independent on-site inspections of the work to assess compliance with project standards.
- Conduct CQA tests and inspections as indicated in the CQAP.
- Record test results and inspections daily.
- Review, records, and maintains all test data.
- Reports the results of all inspections to the Project Engineer.
- Identifies work that should be accepted, rejected, or uncovered for observation or that may require special testing, inspection, or approval.
- Verifies that corrective measures are implemented.
- Prepares final documents and certifications at the request of the Project Engineer for addition to the Project Closeout Report.

3.5 RA CONTRACTOR

- Provides required plans, e.g., health and safety, construction work plans.
- Constructs the project according to the project requirements.
- Obtains all necessary construction permits and approvals.
- Provides project schedules and other required submittals.
- Maintains "record drawings" at the Site properly noting all changes made during construction.
- Is responsible for health and safety of Site personnel, including health and safety orientation and training.
- Cooperates with inspection authorities.
- Manages own subcontractors.
- Retains qualified testing firms (e.g., laboratory, geotechnical) for testing of materials and workmanship to ensure that materials meet specified requirements.

- Submits samples and/or materials for testing to determine if samples and/or materials meet specified requirements, and submits results directly to the CQA Officer.
- Provides Site security.

3.6 HEALTH PHYSICS CONTRACTOR

- Undertakes radiologic walkover surveys within excavation areas.
- Provides Health Physics support.
- Undertakes surveys of equipment that has been in contact with contaminated soils.
- Undertakes daily walkover surveys.
- Responsible for personnel dosimetry.
- Responsible for on-site pre-verification sample analysis.

4.0 PERSONNEL QUALIFICATIONS

4.1 PROJECT MANAGER

- Consulting firm experienced in site investigation, assessment and design and construction of contaminated site remedies.

4.2 PROJECT COORDINATOR

- Consulting firm experienced in site investigation, assessment and design and construction of contaminated site remedies.

4.3 PROJECT ENGINEER

- Consulting firm experienced in design and construction of contaminated site remedies.

4.4 SITE ENGINEER/CQA OFFICER

- Graduate of a recognized college in a technically related field.
- Minimum of 3 years experience in the oversight and implementation of contaminated site remediation and construction QA activities.
- Working knowledge of relevant codes and regulations concerning material and equipment installation, observation and testing procedures, equipment, documentation procedures, and site safety.

4.5 RA CONTRACTOR

- Experience in contaminated site remediation (minimum 5 years of corporate experience).
- Thorough knowledge of testing procedures, equipment, and documentation procedures required for implementation of the remedial activities.
- Senior level point of contact (minimum 10 years experience in contaminated site remediation or equivalent).

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- Discuss the protection of uncompleted remedial work during off hours and during inclement weather.
- Conduct a site tour to review remediation areas, safety areas, and equipment and stockpile storage locations.
- Confirm that each party understands and accepts its responsibility to ensure that the RA is performed to meet or exceed the specified design criteria.

5.2 DAILY PROGRESS MEETING

Purpose: To review daily work schedule progress and health and safety issues. This meeting is intended to be an informal meeting held at the start or end of each work day.

Participants: Site Engineer/CQA Officer, Contractor Superintendent, HS Officer.

Topics:

- Review previous day's activities and progress.
- Review work location and activities for the next day.
- Review health and safety deficiencies from the previous work day and review health and safety requirements and potential problems for the next day's activities.
- Review RA Contractor's personnel, subcontractor personnel, and equipment assignments for the next day.
- Discuss any potential construction problems.

5.3 WEEKLY PROGRESS MEETINGS

Purpose: To review update of work schedule progress and plans on a weekly basis, and identify schedule slippage and corrective efforts, if required.

Participants: Project Engineer, Site Engineer/CQA Officer, Contractor Superintendent, HS Officer, Health Physicist.

Topics:

- Health and Safety report for previous week's activities and progress for the coming week's activities.
- Review work activities from the previous week.

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- An on-site Construction Superintendent (minimum 8 years experience in contaminated site remediation or equivalent) empowered to act on behalf of the Contractor in all field related matters pertaining to the remedial activities.

4.6 HEALTH PHYSICS CONTRACTOR

- Experience in radiological survey techniques (minimum 5 years of corporate experience).
- Experience in high-resolution gamma spectroscopic analysis.
- Thorough knowledge of survey meters and related detectors.
- Experience in personnel dosimetry techniques and requisite documentation and reporting requirements.
- Senior level point-of-contact (minimum 10 years of experience in the Health Physics arena).

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- Comparison of actual progress to scheduled work activities, noting schedule slippage and actions to be implemented to rectify schedule slippage.
- Review work activities for the next week.
- Review potential remedial problems and proposed solutions.

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5.0 PROJECT MEETINGS

Project meetings will be held during the performance of the RA to ensure that all tasks are accomplished according to schedule and that they are completed in accordance with the project requirements. It is anticipated that these progress meetings will be attended by the Project Coordinator, Project Engineer, Site Engineer/CQA Officer, Health Physics Contractor, and RA Contractor Representative(s).

5.1 PRECONSTRUCTION MEETING

Purpose: To resolve any uncertainties in the project requirements, and to review levels of responsibility, reporting requirements, and health and safety requirements.

Participants: Project Coordinator, Project Engineer, Site Engineer/CQA Officer, Contractor Superintendent, HS Officer, Health Physicist.

Topics:

- Discuss RA Work Plan, CQAP, Site-specific Health and Safety Plan (HASP), project schedule, and other relevant documents.
- Review the activities to be conducted during the RA.
- Review roles of each organization relative to the overall project requirements and the CQAP.
- Review lines of authority and communication.
- Discuss the established procedures or protocols for observations and tests including sampling strategies.
- Discuss methods to be used for undertaking and reporting verification and pre-verification sampling and analysis.
- Discuss the established procedures or protocols for handling construction deficiencies, repairs, and re-testing.
- Review methods for documenting and reporting inspection data.
- Review methods for distributing and storing documents and reports.
- Review work area delineation, security, and safety protocols.
- Discuss the location for storing equipment and materials, and the protection of these items during inclement weather.

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6.0 QA INSPECTION AND TESTING ACTIVITIES

6.1 SCOPE

Throughout the implementation of the RA, there will be continuous field inspections and testing requirements for specific work tasks. The field inspection and testing activities will ensure completion of the work according to the designated QA/QC requirements.

Field inspections and testing will provide a qualitative and quantitative means of monitoring the quality and progress of work performed.

The components that will require field inspection or testing are as follows:

- Soil/fill excavation and handling; and
- Backfilling and compaction.

Sampling and analysis of excavated material and post excavation material for radiological parameters will be conducted as described in the RA Work Plan Appendix B - Sampling and Analysis Plan. The RA Contractor will provide assistance to the Site Engineer to facilitate sample collection. Sample analyses will be performed by an independent subcontract laboratory. The Project Engineer and the Site Engineer/CQA Officer will ensure day-to-day coordination of the RA Contractor's activities relative to the radiological testing results.

6.2 FIELD INSPECTIONS

Field inspections will be completed throughout the construction by the Site Engineer/CQA Officer, who will have the primary responsibility for conducting and documenting all QA inspection activities.

The inspections will examine the following, as applicable:

- Quality of workmanship;
- Conformance with specified lines, grades, and elevations;
- Conformance with relevant permit requirements; and
- Conformance with required handling procedures.

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Documentation of all QA inspection activities will be included in the Site Engineer/CQA Officer's log book. Specific observations and results will be documented and attached to the Construction QA Reports.

Any inspection failures, performance problems, or other concerns will be reported immediately to the Project Engineer.

The specific inspection activities, frequencies, and documentation requirements are summarized in Table D.6.1.

7.0 CQA DOCUMENTATION

7.1 GENERAL

This section describes the documentation requirements for the CQA activities. The proper, thorough, and accurate documentation of all CQA activities is necessary to verify that the RA was completed according to the specified requirements.

CQA documentation shall consist of daily records, photographic records, weekly progress reports, and a final report. All records will be maintained at the Site by the Site Engineer/CQA Officer, and copies submitted to the Project Engineer.

7.2 DAILY RECORDS

At a minimum, daily records shall consist of field notes, summaries of daily meeting with the RA Contractor, observation and data sheets, and documentation of any construction problems and associated resolution.

The Site Engineer/CQA Officer will record daily QA activities on observation and data sheets. The observation and data sheets shall include the following information, as applicable:

- Date, time, and weather conditions
- Description of ongoing construction and inspection activities
- A reduced scale Site plan showing work area, including test locations for each work day.
- A summary of test results identified as passing or failing; or in the event of a failed test, retest results
- Test equipment calibrations, if applicable
- Off-Site materials received and approvals given
- A summary of decisions regarding acceptance of the work and/or corrective actions taken
- Submittals made by suppliers verifying material quality
- Quality control test and inspection results
- Construction delays/causes and areas affected
- QA personnel on Site

- QA equipment on Site
- Record of instructions given by the Project Engineer
- Record of changed conditions/conditions encountered
- Contractor's crew size, equipment, and hours worked
- Signature of Site Engineer/CQA Officer

7.3 PHOTOGRAPHS

A photographic record of construction activities will be maintained by the Site Engineer/CQA Officer. Photographs will be identified by location, time, date, and individual photographer.

7.4 WEEKLY PROGRESS REPORTS

The Site Engineer/CQA Officer will prepare weekly progress reports summarizing construction and QA/QC activities. At a minimum, weekly progress reports shall include the following information:

- Date, project name, and location
- Summary of work activities for the week
- Summary of deficiencies and/or delays and corrective actions
- Signature of Site Engineer/CQA Officer

7.5 FINAL REPORT

Upon completion of the RA construction, the Site Engineer/CQA Officer will submit a report to the Project Engineer that summarizes the CQA activities performed during the construction. The report shall contain, at a minimum, the following information:

- Summary of all quality assurance activities
- Complete set of observation and data sheets and field notes
- Complete set of construction photographs
- Sampling, inspection, and testing location plans and results

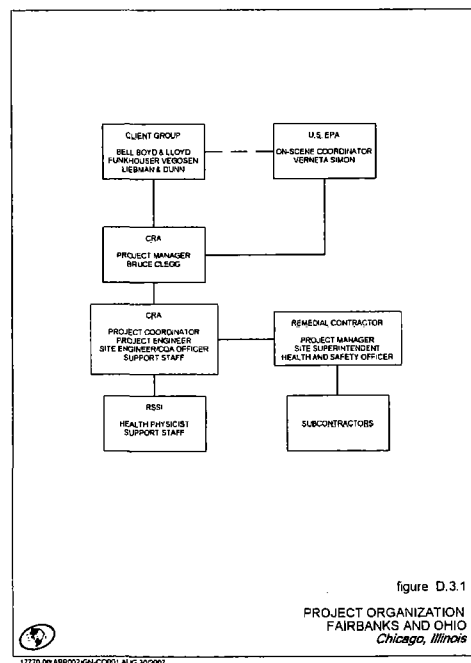


TABLE D.6.1
SUMMARY OF CONSTRUCTION QUALITY ASSURANCE INSPECTIONS AND TESTING

Work Item/Requirement to be Inspected/Verified	Items to be Inspected/Verified	Type of Inspection	Frequency of Inspection	Submittals to Site Engineer	Testing Information
Soil excavation handling	• excavation limits • stockpiled soil properties • exposed and sealed top of backfill	• field survey • visual	• daily as required • daily as required	• none	See Table 1
Backfilling (using on-site material)	• placement and compaction methods • compaction levels	• visual and Survey • visual • compaction tests	• daily as required • daily as required • once per lift	• none	See Tables 2 and 3
Backfilling (using imported material)	• source of backfill • type of backfill • placement and compaction methods • compaction levels	• none • visual • visual • compaction tests	• none • daily as required • daily as required • once per lift	• certification of each source • test results	See Tables 3 and 4

- Backfilling of testing will be performed to determine requirements for material handling, backfilling, and disposal as an exercise with Appendix B "Sampling and Analysis Plan".
- The material to be backfilled will be tested and will be determined to be suitable on the basis of construction testing results and assessment of engineering properties.
- If required, close inspection will consist of comparing test during granular sand or sand and gravel will be used. Documentation of the source of backfill material will be required.
- Backfilling operations will be carried out such that adequate bearing capacity is maintained throughout the backfill. The backfill will be placed in lifts not exceeding 1 foot in thickness, and will be compacted to a minimum of 90 percent standard Proctor maximum dry density (ASTM D1557). For maximum compaction of each material type and backfill material will be calibrated and calibrated for a period of 10 laboratory tests determined to be suitable for use as an exercise with ASTM D1557. A gradation of aggregate or materials will be used for backfill operations, and compaction testing will be performed at a minimum frequency to determine dry placement and compaction results. Compaction testing will be performed using a nuclear densitometer in accordance with ASTM D1557, or other approved method.

ATTACHMENT 1A
TYPICAL CONTRACTOR'S DAILY CONSTRUCTION REPORT

Site Name _____ Date _____
Time _____

Weather Conditions: _____
 Site Personnel/Visitors _____
 Project Coordinator _____
 CQA Inspector _____
 Agency _____
 Contractor _____

Equipment: _____

Construction Activities Performed:

[illegible]

Summary of Work Items Completed:

[illegible]

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DAILY CONSTRUCTION REPORT

Site Names _____ Date _____

Materials Imported:	Submittal	Comments	Approval
1. _____	Yes/No	_____	Yes/No
2. _____	Yes/No	_____	Yes/No
3. _____	Yes/No	_____	Yes/No
4. _____	Yes/No	_____	Yes/No
5. _____	Yes/No	_____	Yes/No
6. _____	Yes/No	_____	Yes/No
7. _____	Yes/No	_____	Yes/No
8. _____	Yes/No	_____	Yes/No

Testing Activities Performed/Location	Comments	Acceptance
1. _____ Yes/No	_____	Yes/No
2. _____ Yes/No	_____	Yes/No
3. _____ Yes/No	_____	Yes/No
4. _____ Yes/No	_____	Yes/No
5. _____ Yes/No	_____	Yes/No
6. _____ Yes/No	_____	Yes/No
7. _____ Yes/No	_____	Yes/No
8. _____ Yes/No	_____	Yes/No

Sampling and Analysis		Comments	Acceptance
Activities Performed/Location	Yes/No		
1. _____	Yes/No _____	_____	Yes/No _____
2. _____	Yes/No _____	_____	Yes/No _____
3. _____	Yes/No _____	_____	Yes/No _____
4. _____	Yes/No _____	_____	Yes/No _____
5. _____	Yes/No _____	_____	Yes/No _____
6. _____	Yes/No _____	_____	Yes/No _____
7. _____	Yes/No _____	_____	Yes/No _____
8. _____	Yes/No _____	_____	Yes/No _____

Testing Equipment Calibration

Notes

PROJECT COORDINATOR: _____
CQA INSPECTOR: _____
CONTRACTOR SUPERINTENDANT: _____

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FIGURE E-4.1 TYPICAL CHAIN-OF-CUSTODY RECORD

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APPENDIX E.A GAMMA RADIATION LEVEL SURVEY PROCEDURE

APPENDIX E.B BUCKET METHOD

1.0 INTRODUCTION

This Field Sampling Plan (FSP) has been prepared by Conestoga-Kowars & Associates (CKA) on behalf of Bell Boyd & Lloyd and Funkhouser Vegesen Lehman & Dunn Ltd. for the Fairbanks and Ohio Autopark Site, Chicago, Illinois (Site). CKA has been retained to oversee the implementation of the scope of work outlined in the Work Plan.

In addition to the Work Plan and ESP, several other documents have been prepared to assist in the overall goal of successfully completing the Removal Action Work Plan, including:

- Quality Assurance Project Plan; and
- Health and Safety Plan.

The purpose of this ESP is to outline the protocols that will be implemented to perform field activities associated with the Site Remedial Action. The ESP supplements the Quality Assurance Project Plan (QAPP) and addresses all sample and field data collection activities. The ESP specifies the sample collection schedules, equipment, and personnel, and includes a Site Plan. The ESP includes a description of monitoring equipment, sampling, and laboratory testing, including:

- description of sampling tasks;
- description of required data collection and laboratory tests;
- required quality assurance and quality control;
- schedule of monitoring frequency;
- identification of monitoring equipment;
- installation of monitoring components and
- maintenance of site equipment

The FSI¹ also includes recording and reporting mechanisms requirements, including:

- daily operating logs, including the field log book;
- laboratory records;
- mechanisms for reporting emergencies or operational difficulties, and
- personnel and maintenance records.

2.0 GENERAL FIELD PROTOCOLS

2.1 OVERVIEW

General protocols applicable to field activities to be completed under this Removal Action are summarized herein.

2.2 DECONTAMINATION PROCEDURES

2.2.1 SAMPLING EQUIPMENT

Excavation equipment will be used, where appropriate (e.g., stockpile sampling) to facilitate sample collection. Prior to use, the bucket of the excavator will be thoroughly decontaminated to remove oil, grease, mud, and other foreign matter.

Equipment decontamination will be performed on the designated decontamination pad. The decontamination pad will facilitate capture of cleaning fluids for proper management. Collected decontamination fluids will be managed as described in Section 2.4.

2.2.2 SAMPLING TOOLS

Sampling tools, such as trowels used for soil sample collection, will be decontaminated prior to field use and after each sample is collected by wiping with clean dry paper towels to prevent cross-contamination between samples. Whenever practicable, dedicated sampling tools will be used to minimize the potential for sample cross-contamination.

If necessary to remove any adhered foreign material, decontamination of tools used for collection of samples for laboratory analyses will be performed as follows:

- wash with potable water and a low-phosphate detergent (AlconoxTM, LiquinoxSM or similar) using a brush, if necessary, to remove all visible foreign matter;
- rinse thoroughly with potable water;
- rinse thoroughly with distilled water; and
- allow the equipment to air dry on a clean plastic sheet as long as possible.

3.0 INVESTIGATIVE PROTOCOLS

3.1 OVERVIEW

In order to support soil removal activities, various forms of monitoring for radiological characteristics may occur. The following discussion details each form of soil monitoring proposed to support this Removal Action.

3.2 GAMMA RADIATION SURVEYS

3.2.1 SURFACE SURVEYS

A surface survey will be conducted to evaluate gamma emitters present at ground surface. Once soil top cover (i.e., asphalt or concrete) is removed and following excavation of soil to designated design elevations, the exposed soil surface will be surveyed in accordance with the gamma radiation level survey procedures set out by Appendix E.A. However, prior to surveying, perpendicular grid lines will be established at 5 meter intervals. The locations will be established with ground level survey techniques and marked with stakes/flagging and paint. Gamma count values will be recorded at each node (i.e., at 5 meter intervals) and within each grid at a minimum 1 meter interval with the highest reading within each grid summarized and reported to US EPA. In order to conduct the survey, the sodium iodide (NaI) survey probe will be positioned normal to ground surface at an average elevation of 2 to 6 inches above ground surface. Grid lines will be traversed at a maximum speed of approximately 0.5 meters per second. Gamma readings will be evaluated in additional areas around grid nodes where individual anomalies are observed.

Following the walkover survey for each lift, material exceeding the US EPA local action level of 71 pCi/g total radium as determined by field screening will be delineated and marked. The soil will be excavated to a depth of 16 inches and placed in lined containers to be removed from the Site for transportation/disposal at the Enclosure disposal facility. The remaining material from the lift will be excavated and stockpiled on-site for further testing and potential re-use as fill as discussed in Section 3.4. At the completion of each lift, the above procedure will be repeated until the final limit of excavation is attained.

The "field screening" gamma count values that may potentially equate to a total radium concentration greater than or equal to 7.1 pCi/g will be established, in advance, by "calibrating" each survey instrument used for soil screening against source material at or

Following the final rinse, each sampling tool will be visually inspected to verify that it is free of soil particulates and other solid material that could contribute to possible sample cross-contamination.

Fluids used for cleaning will not be recycled. Decontamination fluids will be managed as described in Section 2.4.

3.2 FIELD LOG DOCUMENTATION

The field logbook will be a bound document with consecutively numbered pages. The entries for each day will commence on a new page, which will be dated. All entries will be made only in indelible ink. Corrections will be made by marking through the error with a single line, to remain legible, and initialing this action followed by writing the correction. The person making the entries in the logbook will sign or initial each page of entries as they are completed.

The field logbooks generated will be numbered consecutively and maintained by one of CRA's Site representatives. Upon completion of the fieldwork or during periods when fieldwork is not scheduled, the field logbooks will be maintained in CRA's Chicago office. Ultimately, after completion of all stages of fieldwork, the logbooks will be maintained in the document file in CRA's Chicago office.

The following information will be recorded in the field logbook for each sample collected:

- Site location identification;
- unique sample identification number;
- date and time (in 2400-hour time format) of sample collection;
- weather conditions;
- designation as to the type of sample (stockpile, verification, etc.);
- designation as to the means of collection (composite, grab, etc.);
- name of sampler;
- analyses to be performed on sample;
- any other relevant comments such as odor, color, texture, etc.; and
- sample location.

near this clean up concentration. The calibration procedure will account for potential source material in-growth over a 30-day period. In this way, the survey meter measurement will yield a measurement result that is comparable to a total radium concentration that accounts for in-growth and off-Site disposal decisions can be based on the observed result.

3.2.2 RADIOLOGICAL SURVEY OF ON-SITE EQUIPMENT

Equipment operating in active work zones where the potential for contact with contaminated soils is possible will be surveyed prior to movement to a containment reduction zone or demobilization from the Site. Equipment surveys will be conducted using a Geiger-Mueller (GM) counter by moving the probe over the exposed surfaces of each item of equipment being monitored. The survey meter will be operated in accordance with the procedures set out by Appendix E.A. In addition, all disposal containers will be surveyed with a direct reading instrument prior to transport off Site.

3.2.3 DAILY SURVEYS

Routine daily surveys will be performed for each day of Site operations. Routine surveys will monitor areas in the immediate vicinity of excavations and drag movement paths to ensure that radiation levels are not affected by ongoing Site operations.

3.3 VERIFICATION SAMPLING

Verification testing is discussed in Section 4.9.2 of the main work plan.

3.4 SOIL STOCKPILE SAMPLING

3.4.1 OVERVIEW

The objective of sampling the on-Site soil stockpile is to confirm that materials designated as "clean" contain a total radium (Ra-226 + Ra-228) concentration less than US EPA's 7.1 pCi/g cleanup criterion. Details regarding soil stockpile sampling are provided in the following subsection. For soil materials that have already been subject

2.4 WASTE HANDLING PROTOCOLS

Wastes generated during the investigation may include general refuse and decontamination fluids. General refuse, including plastic sheeting, buckets, paper bags, etc., will be disposed of in waste receptacles. Daily refuse and personal protective equipment (PPE) will be collected in plastic bags and disposed of as necessary to keep the Site area neat. PPE and other potentially radiologically-contaminated waste will be segregated from non-contaminated waste for off-Site disposal to Envirocare. Bulk decontamination fluids will be utilized for dust suppression on the soil designated for off-Site disposal to Envirocare.

to screening both in-situ and in the excavator bucket, the stockpile sampling and analysis will be at the discretion of CRA.

3.4.2 DESIGNATED SOIL STOCKPILE

The stockpile will be divided into sections that comprise approximately 100 cubic yards per section. One composite soil sample will be collected from each of the sections for NUTRANI or high resolution gamma spectroscopy analysis. An excavator will be used to remove soil from within the stockpile. Commencing from the top of the stockpile, successive buckets of material will be removed. A soil sub-sample will be collected from the middle of each bucket. Soil sampling will terminate at an elevation of approximately one foot above surrounding grade to prevent accidental penetration of the stockpile underlayer during soil sampling activities.

Soil sample collection protocols for the stockpile are summarized below.

- The stockpile will be divided into sections consisting of approximately 100 cubic yards per section and one sample excavation location will be selected in the center of each section.
- The sample excavation will extend downward to approximately 1-foot above the base of the stockpile. One soil sub-sample will be collected from each bucket of excavated material.
- The soil sub-sample will be collected from within the middle of the bucket, and the remaining material will be cast onto the stockpile away from the sample location. At completion of the sample location, the excavated material will be replaced into the same area from which it was removed.
- The soil will be placed into a clean stainless-steel mixing bowl. The soils within the stainless-steel bowl will be homogenized by mixing the soils with a pre-cleaned stainless-steel spoon or trowel. The composite soil sample will then be placed in an appropriate container for NUTRANI or high resolution gamma spectroscopy analysis.

4.0 ANALYTICAL PLAN

4.1 OVERVIEW

Soil samples collected during the Removal Action will be analyzed by the NUTRANI or high resolution gamma spectroscopy methods. RSSI of Morton Grove, Illinois will perform the analyses. The Removal Action analytical program is summarized in the QA/P.

4.2 SAMPLE HANDLING AND DOCUMENTATION PROTOCOLS

4.2.1 SAMPLE LABELING

Each sample will be labeled with a unique sample number that will facilitate tracking and cross-referencing of sample information. The sample numbering system to be used is described as follows:

Example: SS-MMDDYY-XX-001

where:

- SS - designates types of sample (SS=Soil Sample, V=Verification)
- MMDDYY - designates date of collection presented as month/day/year
- XX - designates sampler's initials
- 001 - designates sequential number starting with 001 at the start of the project

Field duplicate samples also will be numbered with a unique sample number, consistent with the numbering system described above, to prevent laboratory bias of field QC samples.

4.2.2 SAMPLE CONTAINERS AND HANDLING

Samples will be placed in appropriate sample containers, labeled, and properly sealed. Sample labels will include sample number, date and time of collection, and analyses to be performed. Samples will be contained within the shipping containers by the use of bubble pack. Samples will be shipped by commercial courier or hand delivered on a regular basis to the project laboratory.

Two seals using the engineer's chain-of-custody tape will be placed over the lid on the front and back of each shipping container prior to shipment to secure the lid and provide evidence that the samples have not been tampered with en route to the laboratory. The on-Site CRA representative conducting the sampling will be responsible for packaging the samples and sealing and delivering the shipping container to a courier or directly to the laboratory.

Upon receipt of the shipping container at the laboratory, the shipping container will be inspected by the designated sample custodian. The sample custodian will note the condition of the shipping container and seal on the chain-of-custody form. The sample custodian will document the date and time of receipt of the shipping container and sign the chain-of-custody forms.

The sample custodian then will check the contents of the shipping container with those samples listed on the chain-of-custody form. If damage or discrepancies are noticed, the sample custodian will contact CRA for resolution.

4.2.3 CHAIN-OF-CUSTODY FORMS

Chain-of-custody records will be used to track all samples from time of sampling to the arrival of samples at the laboratory. Each shipping container being sent to the laboratory will contain a chain-of-custody form. The chain-of-custody form consists of four copies, which are distributed to the sampler, to the shipper, to the contract laboratory, and to the other file of the engineer. The sampler and shipper will maintain their copies while the other two copies are enclosed in a waterproof enclosure within the shipping container. The laboratory, upon receiving the samples, will complete the remaining copies. The laboratory will maintain one copy for its records. The executed original will be returned to the engineer with the data deliverables package.

A typical chain-of-custody form is presented on Figure E-4.1.

4.3 QUALITY CONTROL

Field duplicates will be collected and analyzed to assess the quality of the data resulting from the field sampling program. Field duplicates are obtained to assess the reproducibility of the analytical data. The investigative and duplicate samples will be obtained from the homogenized aliquot of soil. Each sample will be assigned a unique

sample identification number. Field duplicates will be obtained at a rate of one per 20 investigative samples and analyzed by high resolution gamma spectroscopy.

The Quality Assurance Project Plan (QA/P) prepared for this project provides specific details regarding protocols and checks associated with laboratory analyses and sampling procedures.

4.4 RADIOLOGICAL LABORATORY

Samples for NUTRANI and high resolution gamma spectroscopy analyses will be delivered to the following laboratory:

RSSI
6312 W. Oakton Street
Morton Grove, Illinois 60053-2723
Telephone: (847) 965-1999
Telefax: (847) 965-1991

5.0 PROJECT ORGANIZATION AND RESPONSIBILITY

CRA, consultant to Bell Boyd & Lloyd and Finkbeiner Vogelsen Lieberman & Dunn Ltd., has overall responsibility for all stages of the Removal Action. CRA will perform the sampling activities. All samples will be analyzed by RSSI of Morton Grove, Illinois.

All subcontracted firms will provide project management as appropriate to their responsibilities. CRA will maintain a file copy of all laboratory deliverables. All final project deliverables will be issued by CRA at the explicit direction of the client Group. A summary of each of the key person's responsibilities is presented in the QA/P.

Primary responsibility for project quality rests with CRA's Project Manager. Independent quality assurance will be provided by the laboratory's Project Manager.

During the sampling stage of the project, daily contact between CRA and the laboratory subcontractor will occur. The laboratory will provide status updates by means of preliminary data emails or teleconferences. Should unexpected delays or other problems with the laboratory analyses occur, these would be communicated directly to CRA for resolution. Daily meetings with subcontractors will be held to update the progress of the project activities.

Key CRA contacts during the Removal Action activities are:

Bruce Clegg - Project Manager
Julian Haywood - Project Coordinator
Dave Henderson - Quality Assurance Officer
To Be Determined - Field Coordinator
and Field Quality Assurance Officer
Mr. or Ms. Hickman - Health and Safety Officer
(also referred to as Site Health and Safety Coordinator)

6.0 HEALTH AND SAFETY PLAN

A Site-specific Health and Safety Plan (HASP) has been developed to address activities to be performed at the Site. All field activities will be conducted in accordance with the health and safety protocols outlined in the HASP. The HASP is provided in Appendix G and may be modified in the future to incorporate additional activities proposed during supplemental activities.

7.0 PROJECT DATA MANAGEMENT

7.1 FIELD ACTIVITIES

Information collected during field activities includes, but is not limited to, the following:

- Site layout and survey data;
- Daily records of work conducted;
- Walkover survey results;
- Inventory of materials quantities;
- Screening testing results;
- Sample location surveys;
- Shipping/disposal records;
- Backfill/compaction details and test results; and
- Air monitoring data.

A record of information from the field activities will be maintained by the Site Engineer/Construction Quality Assurance (CQA) Officer. The information will be retained on-Site in hard copy and/or electronic data format. The completed information will be transferred to CRA's permanent office at completion or at intervals as appropriate to the specific type of information and the stage of the work at the Site.

7.2 SAMPLE MANAGEMENT AND TRACKING

All field samples will be collected and maintained under the supervision of the Site Engineer/CQA Officer, and in accordance with the requirements of the RSP and QA/P. Chain-of-custody procedures will be utilized for all samples collected for radiological analysis.

Analytical reports will be provided by the laboratory directly to the Quality Assurance Officer (QAO) and the Site Engineer/CQA Officer. The data will be treated as preliminary and not released for use until the Quality Assurance/Quality Control (QA/QC) review has been performed by the QAO. Final laboratory reports and QA/QC reports will be maintained by the QAO. The final results and associated QA/QC qualifications will be maintained in electronic database format and tabulated for use and presentation.

7.3 DOCUMENT CONTROL AND INVENTORY

Sample results will be managed in a standardized electronic database format. The database will include the following data fields, at minimum:

- Unique sample identification
- Sample type
- Analytical result
- Detection limit
- Data qualifier

All field activities will be recorded daily in the field logbooks. Upon completion of the fieldwork or during periods when fieldwork is not scheduled, the field logbooks will be maintained in CRA's Chicago office. All data originals, including field forms, chain-of-custody forms, and laboratory data deliverables will be maintained in CRA's Chicago office.

Computer-generated data tables will be verified with original laboratory certificates of analysis and with the original field logbook or field-generated forms. Both hard paper copies and computer-based versions of summary tables will be saved in the files. Land survey data will be maintained in the project file as hard copy, and the electronic survey data will be stored with the project's AUTOCAD files.

CRA COMETSON-ROVERS & ASSOCIATES 1815 West Madison Street Chicago, IL 60604 (773) 867-1815									
CHAIN OF CUSTODY RECORD					REFERENCE NUMBER				
PROJECT NAME					PROJECT NAME				
SAMPLE ID					PARAMETERS				
SAMPLE NO.					REMARKS				
SAMPLE									
TOTAL NUMBER OF CONTAINERS									
RECEIVED BY: DATE: TIME: RECEIVED BY: DATE: TIME:					RECEIVED BY: DATE: TIME:				
RECEIVED BY: DATE: TIME: RECEIVED BY: DATE: TIME:					RECEIVED BY: DATE: TIME:				
RECEIVED BY: DATE: TIME: RECEIVED BY: DATE: TIME:					RECEIVED BY: DATE: TIME:				
METHOD OF SHIPMENT					APPROVAL				
White - Fully Executed Copy					SAMPLE TYPE				
Yellow - Recipient Laboratory Copy					RECEIVED FOR LABORATORY BY:				
Pink - Original					DATE: TIME:				
Grey - Sample Copy					DATE: TIME:				

Figure E 4.1
TYPICAL CHAIN-OF-CUSTODY RECORD
FAIRBANKS AND OHIO
Chicago, Illinois

APPENDIX A

GAMMA RADIATION LEVEL SURVEY PROCEDURE

1.0 PURPOSE

This procedure provides protocols for gamma radiation level surveys.

2.0 SCOPE

This procedure applies to preparation and surveys including in-situ soil. Results above the alarm level will be checked by the lead health physicist to ensure the accuracy of the readings. All personnel who use the meter must read and understand the instruction manual for the instrument.

Radiation level surveys will be performed at the site as part of the pre-excavation, pre-verification, and verification surveying programs.

3.0 REFERENCES

- Ludlum 193 Instruction Manual
- Eberline ESP-1 Instruction Manual

The Ludlum Model 193 or Eberline ESP-1 will be used with a 2" x 2" NaI probe. The instrumentation will be calibrated against the TruSource block with known concentrations of natural thorium and the count rate corresponding to a set of concentrations of thorium in equilibrium with the U and Th series progeny including a total of 7.1 pCi/g combined radium.

4.0 EQUIPMENT AND MATERIALS

The following equipment may be used as part of the survey programs. Other equipment may be substituted if necessary because of the availability of the items listed or the conditions encountered at the site.

- 2-inch by 2-inch NaI(Tl) gamma detector; Ludlum Model 193 survey meter or Eberline ESP-1
- CheckSource
- Cables
- Survey Forms

5.0 INSTRUCTIONS FOR RADIOLOGICAL SURVEY

5.1 AREA SURVEY PROCEDURE

- Two perpendicular baselines will be established at 5 meter intervals.
- A grid will be established rectilinear from the baseline. If necessary, stakes, survey flags, or paint will be used to delineate individual grid nodes or traverse lines.
- The baseline, permanent structures, areas of remediation, and other areas of interest will be illustrated in the field logbook.

5.2 GAMMA SURVEY PROCEDURES

- The Ludlum 193 or Eberline ESP-1 procedures are followed.
- Hold the NaI(Tl) probe normal to the ground surface at a height of two to six inches.
- Record results at each grid node and the maximum in each grid.
- Walk slowly along grid lines at a maximum speed of 0.5 meters per second (~1 miles per hour)
- Continue the survey until all survey grids have been traversed.
- Perform off-grid surveys in areas of anomalies.

5.3 RADIOLOGICAL SURVEY OF ON-SITE MATERIALS

- Material that is excavated will have been surveyed twice: prior to excavation, during the walkover survey; and during excavation within the excavator bucket.
- Based on the survey results, the material will either be designated as contaminated material pending transportation and disposal, or tentatively designated as clean and stockpiled for potential use as backfill.

5.4 DAILY SURVEYS

- Routine daily surveys will be performed for each day of the operations at the site.
- Routine surveys will monitor areas in the immediate vicinity of excavations and along movement paths to ensure that radiation levels are not affected by activities.
- Routine surveys shall be documented by preparing a drawing of the survey results in the field logbook, indicating either the location and value of the individual measurements or contours of the measured gamma radiation levels.
- Surveys of the excavation areas will be made at the request of CRA to assess the progress of the removal. These surveys need not be documented and will be used by CRA to manage the excavation.

5.5 PRE-VERIFICATION SURVEY

- Upon completion of excavation activities a pre-verification survey will be performed to ensure that the excavation is ready for final verification sampling and, to ensure that the excavation is ready for backfill based on U.S. EPA approval.
- Surveys will be performed as specified in Sections 5.1 and 5.2. Upon completion of the survey and excavation phase, a Notification of Successful Pre-Verification will be sent to the U.S. EPA. Verification samples will be collected and submitted to U.S. EPA following initial testing by BSR.

APPENDIX B

BUCKET METHOD

1. Surface Soil Sampling

1. To minimize contamination, spread clean plastic sheet next to the area to be sampled and assemble the required sampling equipment and supplies.
2. Enter the required information, including the following, on the Sample Data Form:
 - 2.1 Sample Number
 - 2.2 Sample Matrix
 - 2.3 Sample Location
 - 2.4 Purpose of the Sample Collection
 - 2.5 Include applicable comments regarding the sample, location, weather conditions, or other factors that may be relevant.
 - 2.6 Sample collected by
3. Enter the sample ID and date on the sample container identification label.
4. Collect 5 equal aliquots that are representative of the soil in the surveyed area. Diagonals will be established through each corner and intersecting at the center. Four sample aliquots will be collected from the midpoint of each diagonal between a corner and the center. In addition, a sample aliquot will be collected from the center of each grid. Collect the samples from a depth of 15 cm.
5. Remove rocks, sticks, and foreign objects by sifting through a screen with 1/4-inch openings. The removed rocks will later be surveyed thoroughly using a 2 x 2 Nat (31) detector.

Stir and homogenize the soil in the bucket. Using the hand trowel, scoop soil from the bucket to fill a sample container. Return the excess material to the sampling locations.
6. Decontaminate the sampling equipment as required in the Equipment Cleaning Section.
7. Return any location markers that were removed during sampling. Fill in all sampling holes to eliminate a tripping hazard.
8. Mark a pin flag with the sample identification number and place the flag at the center of the sampling location.

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

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Data handling records that will be maintained include verification of computer programs used to manipulate or reduce raw data into final results and data validation reports. ISSI will maintain documentation of data verification and reduction procedures, as necessary, for the analyses conducted during the project. CRA will maintain checklists, notes, and reports generated during the external data validation process.

2.10.2 DATA REPORTING FORMAT

Field data will be recorded in bound logbooks or on standard forms. The details for recording field data are provided in Section 3.2.2.1 of this QAPP. Field data will be generated primarily from direct-reading meters or will consist of field readings or observations. These data will be tabulated and included in project reports or submittals, as necessary.

Laboratory reports for the analyses will consist of a summary report with applicable QC data. Raw data, MDA studies, and method performance and validation studies will be maintained by ISSI.

2.10.3 DATA ARCHIVING AND RETRIEVAL

All records will be maintained for a period of 7 years following completion of the RA

3.0 DATA GENERATION AND ACQUISITION

The design and implementation of the measurement systems that will be used, including sampling procedures, analytical procedures, and data handling and documentation are detailed in the following subsections.

3.1 SAMPLING PROCESS DESIGN

The rationale for sampling program is provided in the FSP and Section 4.0 the RA Work Plan.

3.1.1 SAMPLING METHODS

Sampling methods are provided in the FSP.

3.1.2 FIELD EQUIPMENT AND SAMPLE CONTAINER CLEANING PROCEDURES

Field equipment cleaning procedures are provided in the FSP. All sample containers will be provided by ISSI.

3.1.3 FIELD EQUIPMENT MAINTENANCE, TESTING, AND INSPECTION REQUIREMENTS

Field equipment will be inspected and tested prior to being shipped to the field. Maintenance logs for all field equipment will be maintained by ISSI. All equipment shipped back from the field is inspected and tested upon return. Any required maintenance is performed and documented prior to the equipment being returned to service.

3.1.4 INSPECTION AND ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND SAMPLE CONTAINERS

The field supplies for the project consist of sample containers to collect the samples. Sample containers will be provided by ISSI, as discussed in Section 3.1.2. ISSI's QA

Officer is ultimately responsible for ensuring that sample containers are acceptable for the project. The acceptability of sample containers for use will be evaluated by receiving lot analysis certificates, as applicable. Containers that do not meet ISSI's acceptability requirements will not be shipped to the field.

3.2 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

The procedures for sample handling, labeling, shipping, and chain-of-custody documentation are provided in the subsections that follow.

3.2.1 SAMPLE HANDLING

The procedures used to collect samples are provided in Section 3.2 of the FSP. The sample numbering system for the project is provided in Section 4.2 of the FSP. Field duplicate samples will be numbered using this system to prevent laboratory bias of field QC samples.

3.2.2 SAMPLE CUSTODY

Chain of custody is the sequence of possession of an item. An item (such as a sample or final evidence file) is considered to be in a person's custody if the item is in actual possession of a person, the item is in the view of the person after being in his/her actual possession, or the item was in a person's physical possession but was placed in a secure area by that person. Field, laboratory, and final evidence file custody procedures are described in the subsections that follow.

3.2.2.1 FIELD CUSTODY PROCEDURES

Logbooks will be used to record field data collection activities. Entries into field logbooks will be described in as much detail as possible to ensure that a particular situation could be reconstructed solely from logbook entries. Field logbooks will be bound field survey books or notebooks with consecutively numbered pages. Logbooks will be assigned to field personnel and will be stored at CRA's Chicago, Illinois office when not in use. Each logbook will be identified by the project-specific document number (010770).

The title page of each logbook will contain the following information:

- person to whom the logbook is assigned;
- logbook number;
- project name;
- project start date; and
- end date.

Entries into the logbook will contain a variety of information. At the beginning of each day's logbook entry, the date, start time, weather conditions, and the names of all sampling team members present will be entered. The names of individuals visiting the site or field sampling team and the purpose of their visit will also be recorded in the field logbook.

All field measurements obtained and samples collected will be recorded. All logbook entries will be made in ink, signed, and dated with no erasures. If an incorrect logbook entry is made, the incorrect information will be crossed out with a single strike mark that is initiated by the person making the erroneous entry. The correct information will be entered into the logbook adjacent to the original entry.

Whenever a sample is collected or a measurement is made, a detailed description of the location will be recorded in the logbook. Photographs taken at a location, if any, will also be noted in the logbook. All equipment used to obtain field measurements will be recorded in the field logbook. In addition, the calibration date for all field measurement equipment will be recorded in the field logbook or on standard field forms.

Samples will be collected following the sampling procedures documented in the FSP. The time of sample collection, sample description, and volume and number of containers will be recorded in the field logbook. Each sample will be uniquely identified using the sample numbering system provided in the FSP.

The packaging and shipping procedures summarized below will ensure that the chain of custody of samples collected for analysis remains intact.

1. The field sampler is personally responsible for the care and custody of the samples until they are transferred to another person or the laboratory. As few people as possible will handle the samples.

2. All sample containers will be identified by using sample labels that include the date of collection and analyses to be performed. Sample labels will be completed for each sample using waterproof ink.
3. Samples will be accompanied by a properly completed chain-of-custody form. The sample identification numbers and required analyses will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving the samples will sign and record the date and time on the form. The chain-of-custody form documents sample custody transfers from the sampler to another person, to the laboratory, or to/from a secure storage area. An example chain-of-custody record form is provided as Figure E-4.1 in the FSP.
4. Samples will be properly packaged for shipment and dispatched to the laboratory for analysis with a separate signed chain-of-custody form enclosed in each shipping container. Shipping containers will be secured with custody tape for shipment to the laboratory. The custody tape is covered with clear plastic tape to prevent accidental damage to the custody tape.
5. If samples are collected with a government agency or other entity, it is the responsibility of that entity to prepare its own chain-of-custody form for the samples. Information regarding the identity of the entity and the samples that are being relocated will be recorded in the field logbook.
6. All sample shipments will be accompanied by the chain-of-custody form identifying its contents. The chain-of-custody form is a four-part carbonless-copy form. The form is completed by the sampling team which, after signing and relinquishing custody to the shipper, retains the bottom (gold/gray) copy. The shipper, if different than the sampling team members, retains the pink copy after relinquishing custody to the laboratory. The yellow copy is retained by the laboratory and the fully executed white copy is returned as part of the data deliverables package.
7. If the samples are sent by common carrier, a bill of lading (e.g., FedEx airbill) will be used and copies will be retained as permanent documentation. Commercial carriers are not required to sign the chain-of-custody form as long as the form is sealed inside the shipping container and the custody tape remains intact.

3.2.2.2 LABORATORY CUSTODY PROCEDURES

Laboratory sample custody begins when the samples are received at the laboratory. The field sample identification numbers, laboratory sample identification numbers, date and

time of sample collection, date and time of sample receipt, and requested analyses will be entered into the sample receiving log.

Following log-in, all samples will be stored within an access-controlled location and will be maintained until completion of all laboratory analyses. Unused sample aliquots and sample extracts will be maintained for a minimum of 30 days following receipt of the final report by CRA. ISSI will be responsible for the disposal of unused sample aliquots and sample containers in accordance with all applicable local, state, and federal regulations.

ISSI will be responsible for maintaining analytical logbooks and laboratory data. All laboratory records will be maintained consistent with the record retention requirements in Section 2.10.3 of this QAPP.

3.2.2.3 FINAL EVIDENCE FILES CUSTODY PROCEDURES

The final evidence file for the project will be maintained by CRA and will consist of the following:

1. project plan;
2. project log books;
3. field data records;
4. sample identification documents;
5. chain-of-custody records;
6. correspondence;
7. references, literature;
8. final data packages;
9. miscellaneous - photos, maps, drawings, etc.; and
10. final report.

The final evidence file materials will be the responsibility of the evidentiary file custodian (CRA's Project Manager) with respect to maintenance and document removal.

3.3 ANALYTICAL METHOD REQUIREMENTS

The field and laboratory analytical methods that will be used during the investigation are detailed in the following subsections.

3.3.1 FIELD ANALYTICAL METHODS

The SOP for field gamma radiation level surveys is provided in Attachment A.

3.3.2 LABORATORY ANALYTICAL METHODS

The SOP for gamma spectroscopy analysis that will be used to analyze confirmation soil samples is presented in Attachment A.

3.4 QUALITY CONTROL REQUIREMENTS

The field and laboratory QC requirements for the project are discussed in the following subsections.

3.4.1 FIELD SAMPLING QUALITY CONTROL

Field QC requirements include analyzing reference standards for instrument calibration and for routine calibration checks. Field QC samples for this project include field duplicate samples to assess the overall precision of the sampling and analysis event. The frequency of collection for these field QC samples was provided in Section 2.8 of this QAPP. The evaluation of field QC data is provided in Section A.9.2 of this QAPP.

3.4.2 ANALYTICAL QUALITY CONTROL

The laboratory QC requirements are in ISSSI's SOP in Attachment A.

3.5 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

The procedures used to verify that instruments and equipment are functional and properly maintained are described in the following subsections.

3.5.1 FIELD INSTRUMENT MAINTENANCE

Specific preventive maintenance procedures to be followed for field equipment are those recommended by the manufacturer.

3.5.2 LABORATORY INSTRUMENT MAINTENANCE

As part of its QA/QC program, ISSSI conducts routine preventive maintenance to minimize the occurrence of instrument failure and other system malfunctions. Designated laboratory employees will regularly perform routine scheduled maintenance and repair of (or coordinate the repair of) all instruments. All maintenance that is performed is documented in the laboratory's maintenance logbooks. All laboratory instruments are maintained in accordance with manufacturer's specifications.

3.6 CALIBRATION PROCEDURES AND FREQUENCY

The procedures for maintaining the accuracy of all the instruments and measuring equipment that are used for conducting field tests and laboratory analyses are described in the following subsections. These instruments and equipment will be calibrated prior to each use or according to a periodic schedule.

3.6.1 FIELD INSTRUMENTS/EQUIPMENT

Equipment to be used during field sampling will be examined to confirm that it is in operating condition. This includes checking the manufacturer's operating manual to ensure that all maintenance requirements are being observed. Individual calibration records will be reviewed to ensure that any prior equipment problems have not been overlooked and all necessary repairs to equipment have been completed.

3.6.2 LABORATORY INSTRUMENTS

Calibration of laboratory equipment will be based on approved written procedures. Records of calibration, repairs, or replacement will be filed and maintained by the designated laboratory personnel performing these quality control activities. These records generally will be filed at the location where the work is performed and will be subject to QA audit. For all instruments, the laboratory will maintain a properly trained repair staff with in-house spare parts or will maintain service contracts with vendors. Specific calibration procedures and frequencies are detailed in ISSSI's SOP.

3.7 INSPECTION/ACCEPTANCE CRITERIA FOR SUPPLIES AND CONSUMABLES

The procedures that will be used to ensure that supplies and consumables used in the field and laboratory will be available as needed and free of contaminants are detailed in the following subsections.

3.7.1 FIELD SUPPLIES AND CONSUMABLES

Supplies and consumables for field measurements and sampling will be obtained from various vendors and include calibration solutions, sample containers, and detergent and distilled water for field instrument cleaning. Additional field supplies and consumables include personal protective equipment. All field supplies will be consumed or replaced with sufficient frequency to prevent deterioration or degradation that may interfere with the analyses.

3.7.2 LABORATORY SUPPLIES AND CONSUMABLES

Vendors for general laboratory reagents used by ISSSI include C&MA Associates, Inc. ISSSI's QA Officer is ultimately responsible for the ensuring the acceptability of supplies and consumables.

3.8 DATA ACQUISITION REQUIREMENTS (NON-DIRECT MEASUREMENTS)

Historical data have been generated during sampling events by others. These data are usable for quantitative and qualitative purposes.

3.9 DATA MANAGEMENT

The procedures for managing data from generation to final use and storage are detailed in subsections that follow.

3.9.1 DATA RECORDING

Field data will be recorded in field logbooks and consist of measurements from direct-reading instruments or direct measurements. Field staff are responsible for recording field data, and the Field QA Officer is responsible for identifying and correcting any recording errors.

Laboratory data are recorded in a variety of formats. Data from instruments are recorded on magnetic media, strip charts, or bench sheets. ISSSI's SOP provides the data recording requirements.

3.9.2 DATA VALIDATION

Validation of field data for this project will primarily consist of checking for transcription errors and review of data recorded in field logbooks. Data transcribed from the field logbook into summary tables for reporting purposes will be verified for correctness by the Field QA Officer or his designee. Any limitations on the use of field data will be included in the reports.

Validation of the laboratory data will be performed by CRA's QA Officer or his designee based on the measurement performance criteria specified in this QAPP. Data validation will be performed on 100 percent of the data. The results of the data validation process will be documented in a memorandum that specifies all limitations on the usability of the analysis data.

3.9.3 DATA TRANSFORMATION/DATA REDUCTION

Field data reduction procedures will be minimal in scope compared to those implemented for laboratory data. Only direct-reading instrumentation will be employed in the field. These data will be recorded in field logbooks or on standard forms immediately after the measurements are obtained.

Laboratory data reduction procedures typically will be conducted according to the following protocol:

1. Raw data produced and checked by the responsible analyst is turned over for independent review by another analyst.
2. The area supervisor or senior chemist reviews the data for attainment of QC acceptance criteria.
3. The area supervisor will decide whether any sample re-analysis is required.
4. Upon completion of all reviews and acceptance of the raw data by the area supervisor, a report will be generated and sent to the laboratory Project Manager.
5. The laboratory Project Manager will complete a thorough inspection of all reports.
6. Following review and approval of the preliminary report by the laboratory Project Manager, final reports will be generated and signed.

3.9.4 DATA TRANSMITTAL/TRANSFER

Field measurements will be entered into a standard Microsoft Excel spreadsheet format, as necessary. CRA's Field QA Officer is responsible for verifying the correctness of the field data after the data are transferred to a spreadsheet format. Geographical and field data are maintained in a database that is described below.

Electronic data deliverables (EDDs) will be provided by ISSSI in a format compatible with Earlbank's EQuIS database product. EQuIS uses Microsoft Access as its database. EDDs are imported into EQuIS, and the data are maintained in the database for manipulation and presentation.

CRA's QA Officer is responsible for verifying the correctness of the analytical database after the laboratory data have been imported. This is accomplished by comparing the data from the database to the hardcopy analytical reports for a minimum of 10 percent of the

sample results. If discrepancies between the database and hardcopy analytical reports are identified, a complete verification of the database will be performed or a new EDD will be submitted, imported, and verified as described previously.

3.9.5 DATA ANALYSIS

The data from the sampling and analysis program will be compared to US EPA's local action level of 7.1 pCi/g (total radium).

3.9.6 DATA ASSESSMENT

Assessment of laboratory data by ISSSI will be performed using the procedures detailed in its SOP. These assessments may include determining the mean, standard deviation, percent relative standard deviation (RSD), percent difference (RPD), and percent recovery for certain QC elements.

Assessment of QC data for data validation purposes may include determining the mean, standard deviation, percent RSD, percent recovery, RPD, and percent completeness. The statistical equations to determine percent recovery, RPD, and percent completeness are provided in Section 5.3 of this QAPP.

3.9.7 DATA TRACKING

Data generated in the field will be recorded in field logbooks or on standard field forms. There are no unique or special tracking requirements for these data. The data will be transcribed for analysis and reporting as discussed in Section 3.9.3, and field logbooks will be maintained in the final evidence file.

Laboratory data tracking procedures will be consistent with ISSSI's standard procedures for tracking data from generation to reporting. ISSSI's Operations Manager is ultimately responsible for data tracking in the laboratory.

Tracking analytical data in the EQuIS database includes recording the laboratory generating the data, the date when the EDD was received and imported, the date when qualifiers were applied to the results, and the level of data validation performed. CRA's

5.1.9. The net 6.4V Cs-137 peak is used to align the spectrum. Move the Region of Interest (ROI) markers around the peak and obtain the centroid channel. To obtain the ROI information, change the Time Info window at the bottom to Marker Info by entering Next or Prev.

5.1.10. Adjust the Cs-137 peak by manipulating the Pin Gain on the amplifier. Turn the knob clockwise to increase the energy of the peak, and turn it counter clockwise to decrease the energy of the peak. Continue to do this until the Cs-137 peak is between 661.0 and 662.0 keV. Adjust the peak to as close to 661.6 keV as you can achieve.

5.1.11. Record the peak energies you obtained on the "Count2K/NUTRANI QA" sheet. Record line gains, Date, and initial in the sheet.

(Note: While adjusting the Cs-137 peak, waiting for at least 60 seconds to smooth out statistical energy variations before adjusting. Freeze the old spectrum from the screen each time after adjusting.)

5.1.12. Close CARRA.

5.2. Performance and Background Check

5.2.1. Place the Ra-226 constant source in the well counter. The word "Iron" should be showing the operator as it is placed in the well counter. Replace the lead cover.

5.2.2. Select "NUTRANI Analysis" on the Windows desktop.

5.2.3. Three windows will appear for NUTRANI. A smaller window entitled "NUTRANI Analysis" allows you to enter sample information. Enter the following information:

Sample ID: RA "Date" (e.g. RA06/20 for 5/2/05)
Sample Title: RA-226 Check
Sample Group: CRA-RS61
Date/Time: Automatically adjusts, do not change
Sample Weight: 1
Count Time: 300

Select OK. NUTRANI will count and analyze for 300 seconds. After the 300 second count has elapsed the "NUTRANI Analysis" sample screen will reappear.

5.2.4. Remove the Ra-226 source. With the chamber empty, run another analysis with the following sample information:

Sample ID: "Date" (e.g. TB02/03 for 5/2/05)
Sample Title: Empty Chamber
Sample Group: CRA-RS61
Date/Time: Automatically adjusts, do not change
Sample Weight: 1
Count Time: 300

Once this analysis has finished, Select "Cancel"

5.2.5. On the Windows Desktop, select the "NUTRANI Results" shortcut. Select the Modified bar to locate your file, open by double clicking on the test file (e.g. RA060205) and print.

5.2.6. Retrieve the RA-226 folder. Initial the sheet and place the printout in the folder after comparison of the current printout to the prior printout. The results should be within one statistical deviation.

5.2.7. Repeat the above procedure with the empty chamber results file (e.g. TB0205). The results should be within one statistical deviation.

5.2.8. Update the RA226 check.xls spreadsheet with the results for the Ra-226 test (on the RA-226 tab) and the Empty Chamber test (on the Empty Chamber tab).

5.2.9. Return constant sources to storage.

5.3. Sample Analysis

5.3.1. Select "NUTRANI Analysis" on the Windows 98 desktop.

5.3.2. After obtaining samples from CRA, sign the chain of custody form and place that sheet in the chain of custody folder. CRA will be provided with copies of all chain-of-custody forms.

5.3.3. Log the samples on the NUTRANI Log Sheet. Assign each sample a unique RS61 sample number (e.g. CRA100). Place an RS61 sticker with the correct sample ID and the date of collection on the NUTRANI vial. Write the sample number on the white cap in addition to the sticker (in case of identification from above). Use an indelible marker. Obtain the net weight of the sample (total weight minus the vial weight (written on the vial lid)). Record information on the NUTRANI Log Sheet including date collected, date analyzed, net weight, location of the sample and initial the form.

Place the new sample in the well counter and replace the lead cover. On the "NUTRANI Analysis" window record the sample information as described below.

Sample ID: RS61 Sample ID Number (e.g. CRA100)
Sample Title: Unique CRA Grid Location
Sample Group: CRA-RS61
Date/Time: Automatically adjusts, do not change
Sample Weight: Enter the net weight of vial here
Count Time: 300

If samples are EPA verification samples, note this after the grid location on the sample title line.

The statilized information must be updated for each sample. The Count Time is always 300 seconds (5 minutes), and the Date/Time is automatically updated when the sample is analyzed by the program. Select OK.

5.3.4. NUTRANI will automatically count for 300 seconds and perform the data reduction. NUTRANI writes the results to a text file with the same name as the Sample ID and a .txt extension.

5.3.5. Repeat Step 3 for each sample.

5.3.6. After all samples have been counted and analyzed, Select Cancel to exit NUTRANI.

5.3.7. Select the "NUTRANI Results" shortcut on the Windows desktop to go to the directory where the NUTRANI sample analyses are stored.

5.3.8. Select "Modified" on the toolbar until the most recent files are at the top of the window. Select a file to open the results. Print 1 unedited copy for RS61's records. Enter label information in the results and print them out for reporting purposes (The form of the printout, and the changes you need to make are in Appendix A).

5.3.9. Make one edited copy (with labels) for RS61's records and one edited copy for CRA.

5.3.10. Punch RS61's copy and place it in the "NUTRANI Reports" folder. CRA's copy is punched and placed in the "Copies for CRA" folder. The unedited copy is to be punched and placed in the "Unedited NUTRANI Reports" folder. One hundred NUTRANI results are placed in each folder.

5.3.11. Update NUTRANI logs. The information recorded on the NUTRANI Log Sheet in Step 3 is entered into the appropriate worksheet and line number. This is a duplicate of the log in sheet.

Appendix A

Initial and Finalized NUTRANI Report Format

8
30673.94 4931.59
93.61 250.07
302.10 465.56
79859.32 11974.61
1.00
20.00
20.00
20.00
20.00
20.00
11 5900.05
0
"File ID: CRA100"
"Description: B-1"
Date and Time (Automatic)
CRA-RS61
1

Example of Initial Report

5.3.12. After the results have been printed, enter the results into the spreadsheet on the worksheet titled "Results". Information from the log-in sheet is automatically copied to the appropriate line of the Results worksheet. The right half of this worksheet is where the analytical results are entered, by radionuclide in the order NUTRANI provided results. The result for each radionuclide followed by the error range. If a sample is re-analyzed, each subsequent analysis utilizes the sample number followed by a letter. The results of the re-runs are not included in the results summary spreadsheet. A note is placed in the last column indicating the reruns.

5.3.13. Update East Ohio Logbook in Word. The format used is the HP's initials, the number of samples received and analyzed, and the sample ID. Note any problems encountered with the system, and note if USEPA collected samples for analysis at Argonne.

5.3.14. When an area of the site is ready for EPA sign off, EPA Verification Samples are collected in vials. These vials are analyzed using NUTRANI. After analysis using NUTRANI, USEPA will collect the samples for analysis at Argonne. On a copy of the original Chain of Custody form, indicate that RS61 has relinquished the samples to the USEPA. Make a copy of this chain (with the USEPA representative's signature) and place it in the Chain-of-Custody Report binder. Place a record in the trace of analyzed sample vials identifying the vials taken by USEPA and the date.

If the samples are returned, THEY WILL NEED NEW SAMPLE NUMBERS IF THEY WERE EPA VERIFICATION SAMPLES, because Argonne consolidates samples into a 120 gram sample. Also record the date on the results worksheet of the NUTRANI logs spreadsheet that samples were sent to Argonne.

Modification of the Report

1. Add the U-238, TH-232, RA-226, and K-40 headings to the rows.
2. Align the decimal points of the values, and place a +/- between the values.
3. Remove all unnecessary lines from the report.
4. Remove any symbols below the CKA ISSN line.
5. Add "NUTRANI RESULTS" below the CKA ISSN line.

Example of Modified Report

U-238 31.94 +/- 27.23
TH-232 23.89 +/- 6.54
RA-226 281.13 +/- 2.08
K-40 94.00 +/- 136.81

CKA1001
R-1
15/102/15 15.53
CKA-1551
NUTRANI RESULTS

\\SSN2\SYS\HOME\40001 Health\Physis\CKA\247\2005 NUTRANI\Nutranl System
2.xls

NUTRANI SAMPLE PREPARATION PROCEDURE

1. Purpose

The purpose of this procedure is to provide guidance for the preparation of samples for NUTRANI analysis of radioactive materials. This procedure describes the steps for analysis of samples utilizing the NUTRANI method, which uses low resolution gamma spectroscopy and Ker-McGee proprietary software to rapidly analyze small samples for low specific activities of uranium and thorium series radionuclides.

2. Scope

This procedure applies to all soil-type environmental samples, including soil, concrete, and construction debris to be analyzed using the NUTRANI system. All personnel who collect or prepare samples for NUTRANI analysis must be familiar with and have access to this procedure.

3. References

- 3.1. None.

4. Equipment and Materials

- 4.1. 20 ml sample vials
- 4.2. Labels
- 4.3. Field log book
- 4.4. Disposable gloves
- 4.5. 1/4 inch screen
- 4.6. Portable survey meter with a shielded 2" x 2" NaI(Tl) detector

5. Procedure

5.1. Sample Location Selection

If the soil being sampled is homogeneous, the locations for samples can be selected randomly over the volume of the soil.

If the soil is not homogeneous, the area must be broken into sub-volumes in which the soils are homogeneous. Each volume is sampled.

5.2. Sampling methods

5.2.1. Enter the complete information on the Sample Data Form.

- 5.2.1.1. Sample Number
- 5.2.1.2. Sample location
- 5.2.1.3. Purpose for the Sample Collection
- 5.2.1.4. Initials

5.2.2. Place an identification label on a vial

5.2.3. Samples are approximately 20 grams, screened through a 1/4 inch screen

5.2.4. Samples are collected in 20 ml sample vials.

5.2.5. With the 2" x 2" NaI(Tl) detector, survey the material that does not fit through the screen. If no activity is detected above the site action level, return material to clean fill material. If activity is detected, notify XXX for instructions.

5.3. Sample analysis

5.3.1. Samples are brought to the sample receiving area and the following information is entered in the "Sample Log Book"

- 5.3.1.1. Number of samples
- 5.3.1.2. Origination of sample
- 5.3.1.3. Date received
- 5.3.1.4. Initials

5.3.2. A sample number is assigned to each sample in the log book.

5.3.3. Submit the vials to the laboratory for NUTRANI analysis.

6. Records/Reports/Notifications

- 6.1. Notify the laboratory personnel when the samples are properly labeled and are awaiting analysis.
- 6.2. Samples shall be retained until all evaluations have been completed and the sample is no longer needed.
- 6.3. Logbooks shall be maintained by the lab until complete and then stored in the project files.

7. Attachments

- 7.1. None

H:\HOME\40001 Health\Physis\CKA\Standard Operating Procedures\NUTRANI Sample Preparation Procedures.xls

APPENDIX G

HEALTH AND SAFETY PLAN

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CONFESTOGA-ROVERS & ASSOCIATES

EMERGENCY PLAN

The Site Health and Safety Coordinator (HSC) will coordinate the emergency response at the Site. In the event of any emergency, the HSC is to be notified and will be responsible for notifying the proper response agencies listed in Table 1.0, Emergency Phone Numbers. Emergency response procedures, instruction for emergency response to injuries, and evacuation plans will be reviewed at safety briefings.

Table 1.0 will be posted by the HSC in appropriate areas. The emergency numbers will be reviewed every three months by the HSC and revised as necessary. The HSC will sign and date new revisions. Upon revision, the table will be submitted to the United States Environmental Protection Agency (USEPA), and the City of Chicago.

Emergency services are to be provided via the 911 Emergency Medical system. Non-emergency services will be provided by Northwestern Memorial Hospital. Directions to this location are found on Figure 2.3.

The HSC will implement the emergency action plan when conditions at the Site warrant such action. The HSC will be responsible for coordinating the evacuation, emergency treatment, and emergency transport of site personnel, as necessary, and inform the appropriate coordinating management staff. The following are examples of conditions that may require implementation of the emergency action plan:

- Fire or explosion on site.
- Serious personnel injury.
- Release of radioactivity exceeding limits as described later in this HASP.
- Release of hazardous materials, including gases or vapors at elevated levels.
- Unsafe working conditions, such as inclement weather (tornado, hail, etc.).

In the event excavation within the potentially impacted area is required on an emergency basis, the following shall be incorporated to the extent possible, and all personnel working in the potentially impacted areas shall be given the opportunity to read this section of the Health and Safety Plan (HASP). The remainder of the attached HASP will be implemented as conditions allow.

PROTECT WORKERS POTENTIALLY EXPOSED TO IMPACTED SOIL

- 1) Notify workers that levels of radiation above background levels may be present in excavated soil.

- 2) Avoid ingesting soil. Avoid inhaling dust from contaminated areas. Minimize contact with the soil to the extent possible. Wear protective coveralls or disposable coveralls to facilitate decontamination of workers.
- 3) Screen excavation for gamma radiation.

AVOID SPREAD OF CONTAMINATION

- 1) Limit erosion transport of excavated soil through use of bar bales, sandbags, or temporary berm materials to minimize uncontrolled runoff.
- 2) Cover any excavated soil piles until screened for potential contamination.
- 3) Screen soil prior to transport away from project site.
- 4) Do not remove equipment which has been in contact with potential contamination until it has been checked and released.

MINIMIZE POTENTIAL PUBLIC CONTACT

- 1) Limit access to excavated soil using barricades, temporary fencing, or jersey barriers.
- 2) Cover excavated piles to minimize fugitive dust. Wet dusty excavations.
- 3) Control, to the extent possible, off-site tracking by vehicles, and potentially contaminated boots or clothing worn by workers.

MONITOR CONTAMINATION

To the extent practicable, provide gamma radiation screening of the exposed soils in the excavation.

- 1) When possible, provide high volume air samples immediately adjacent to potential or known exposed contaminated soil, to monitor for fugitive emissions.
- 2) Survey ground surface/pavement surface around potential or known contamination locations for elevated gamma radiation.

DISPOSAL

- 1) Any excavated material should be disposed of as required by law.

CONFESTOGA-ROVERS & ASSOCIATES

CONFESTOGA-ROVERS & ASSOCIATES

NOTIFY AUTHORITIES

- 1) Notify agencies identified on the enclosed emergency notification list.
- USEPA 312-353-2318 (US Environmental Protection Agency)
CDR 312-744-7872 (Chicago Department of Environment)
DMA 217-782-7660 (Illinois Emergency Management Agency, Division of Nuclear Safety)

Notification should include, as a minimum, the following:

- Location of Excavation
- Potential Contact with Thorium Containing Soil
- Field surveys measuring maximum reading
- Samples measuring maximum reading

The following support services should be secured:

- Gamma radiation survey equipment should be secured promptly for site screening.
- Personnel and monitoring equipment should be secured promptly to provide survey and monitoring services in accordance with the attached plan, and to survey equipment for release as uncontaminated.

1.0 SCOPE OF PLAN

The following Health and Safety Plan (HASP) will be utilized and modified as necessary in order to minimize and prevent exposures to hazardous substances and conditions related to all excavation and restoration activities at 237 East Ohio Street, Chicago, Illinois. All CRA personnel assigned to this project will be required to review thoroughly the contents of the HASP and to adhere strictly to the policies and procedures listed herein. This HASP is for use only by Conestoga-Rovers & Associates personnel. Contractors and subcontractors shall develop activity specific HASPs which are specific to their Scope of Work (SOW) and are in accordance with the generic HASP which is located on the USEPA Region 5 website at the following web address: www.epa.gov/Region5/sites/lindeydlght/pdft/lindeydlght_healthplan.PDF.

This plan meets the requirements of OSHA 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, and applicable subparts of OSHA 29 CFR 1926, 1910. Visitors will be required to review the Health and Safety Plan and read and sign the visitor information sheet (Form 1.1).

Additional details including a project overview, brief Site history and project organization is found in Appendix A.

1.1 BASIS FOR DESIGN

Regulations set forth by OSHA in Title 29, CFR, Parts 1910 and 1926 (29 CFR 1910 and 1926) form the basis of this section of the HASP. Emphasis is placed on Section 1926.65 (Hazardous Waste Operations and Emergency Response), 1910 Subpart I (Personal Protective Equipment), 1910 Subpart Z (Toxic and Hazardous Substances), 1926 Subpart O (Motor Vehicles, Mechanized Equipment, and Marine Operations), and 1926 Subpart F (Excavations). Some of the specifications within this section are in addition to the OSHA regulations, and reflect the positions of the United States Environmental Protection Agency (USEPA), and the National Institute for Occupational Safety and Health (NIOSH) regarding safe operating procedures at hazardous waste sites. Regulations regarding radioactive materials are discussed earlier in this HASP.

The health and safety of the public and Site personnel and the protection of the environment will take precedence over cost and scheduling considerations.

2.0 SAFETY MANAGEMENT

The following safety management structure will be utilized for the implementation, administration, and monitoring of the HASP.

2.1 HEALTH AND SAFETY COORDINATOR

The Health and Safety Coordinator (HSC) shall assume overall responsibility for the HASP. The HSC or designee shall monitor and maintain quality assurance of the HASP until project completion. Principal duties of the HSC include:

- Review project background data;
- Approve all HASP modifications;
- Administer and enforce the HASP;
- Evaluate the adequacy of personal protective equipment (PPE) to be used by Site personnel;
- Conduct required on-site training;
- Brief visitors on work-site conditions; and
- Administer personnel and ambient air monitoring procedures.

The HSC or designee has the authority to stop work in the event conditions develop which pose an unreasonable risk to Site personnel or persons in the vicinity.

3.0 PERSONNEL RESPONSIBILITIES

The HSC or designee will administer and supervise the HASP at the work-site level. The HSC will monitor all operations, be the primary on-site contact for health and safety issues, and have full authority to stop operations if conditions are judged to be hazardous to on-site personnel or the public.

The HSC will brief all Site personnel on the contents of the HASP. Personnel will be required to review the HASP, and have the opportunity to ask questions about the planned work or hazards. The HSC will conduct safety meetings to familiarize the Site personnel with Site conditions, boundaries, and physical hazards. Site personnel will conduct their assigned tasks in accordance with the HASP at all times.

All individuals on the Site will observe all Site health and safety rules, and will not commit any unsafe conditions, use faulty equipment or willfully cause conditions that could jeopardize health and safety of Site personnel.

If at any time Site personnel observe unsafe conditions, faulty equipment or other conditions which could jeopardize personnel health and safety, they are required to immediately report their observations to the HSC.

Work zones will be established at the Site. These zones include clean/support zones, decontamination zones, and exclusion zones. Known impacted areas where exclusion zones are to be established during the removal effort are shown on Figure 3.1. Although the clean/support zones are anticipated to remain fixed, other zones will be identified as excavation work progresses.

If unanticipated conditions arise, work at the Site will cease until the specific hazards can be identified. Site control requirements are outlined in Appendix B.

4.0 HAZARD ASSESSMENT

The following represents potential hazards associated with this project.

4.1 PRINCIPAL CONTAMINANTS (KNOWN OR SUSPECTED)

Thorium series, Uranium series including isotopes of Radium, Radon and their daughters. The contaminants are present in the soil at low concentrations. These primary routes of entry to the body will be considered:

Route	Entry Made Via
Inhalation	Airborne dust containing radioactive materials.
Ingestion	Airborne dust containing radioactive materials. Improper personal hygiene practices.
Eye and Skin	Direct contact with contaminants. Improper or poor personal hygiene practices. Airborne dust containing radioactive materials. Cuts and abrasions.
External	Penetrating radiation.

Should unanticipated hazards be discovered at the Site, such that they change the initial SOW, work at the Site will cease until specific hazards can be identified. Additional hazards will be identified and the work area will be controlled in accordance with the procedures outlined in Appendix B.

4.2 PHYSICAL HAZARDS

Before field activities begin, the HSC will conduct a Site reconnaissance to identify any existing or potential hazards created from Site activities. Physical hazards inherent to construction activities and power-operated equipment may exist. Excavation activities will follow the procedure outlined in Appendix B.

4.2.1 HEAT STRESS

There are a variety of measures that can be implemented to prevent or reduce the likelihood of employees developing heat stress related disorders. These include fluid and electrolyte replenishment, the provision of shelter from the sun and heat, work schedule adjustment, the use of cooling devices, acclimatization, heat stress monitoring, and employee education, as discussed below.

- **Fluid and Electrolyte Replenishment:** Personnel should drink about 16 ounces of water before starting work and drink water at every break. To encourage water consumption, cool water and disposable cups should be made available. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, personnel should be encouraged to drink more. Replacing body fluids with Gatorade is an option. It is advisable to have Gatorade on site if the air temperature is 70°F (21°C) or more and the workers are performing tasks with a moderate to heavy work load in chemical resistant clothing.
- **Shelter from the Sun and Heat:** Air-conditioned (if possible) or shaded areas should be made available for rest periods. Sitting in an air-conditioned truck is an acceptable option.
- **Work Schedule Adjustment:** Scheduling work for early mornings and/or late afternoons will avoid the hottest parts of the day and reduce the heat stress placed on personnel. Rotation of personnel will help reduce overexertion of workers and adjusting the work-rest schedule will help personnel recover from the effects of heat stress periodically.
- **Use of Cooling Devices:** The use of cooling devices like field showers, hose-down areas, or cooling vests should be considered for project tasks that involve heavy work loads in chemical resistant clothing.
- **Acclimatization:** Acclimatization is the gradual introduction of workers into a hot environment to allow their body to physiologically adjust to hot working conditions. Acclimatized individuals generally have lower heart rates and lower body temperatures. In addition, they sweat sooner and more profusely and even have more dilute sweat (thereby losing less electrolytes) than non-acclimatized individuals.
- **Heat Stress Monitoring:** Monitoring hot environments for potential heat stress should be initiated when the ambient air temperature is in excess of 70°F. There are several ways to monitor heat stress: measuring heart rate, oral temperature, loss of body weight, and the Wet Bulb Globe Temperature using a Rester-Stokes or Quest

Electronic heat stress monitor. CRA employees are advised to measure their heart rates as a primary means of heat stress monitoring.

- **Employee Education:** Workers have already been trained to recognize and treat the effects of heat stress during the without training course. Signs, symptoms, and treatment of heat stress should be discussed in site safety meetings. The buddy system will help in preventing heat stress once the employees are trained to recognize the signs and symptoms of heat stress.

4.2.2 COLD STRESS

If the field activities occur during a period when temperatures average below freezing, the following guidelines will be followed:

Persons working outdoors in temperatures of 50°F and below may suffer from cold exposure if there is air movement. During prolonged outdoor periods with inadequate clothing, effects of cold exposure may even occur at temperatures well above freezing. Cold exposure may cause severe injury by freezing exposed body surfaces (frostbite) or result in profound generalized cooling, possibly causing death. Areas of the body which have high surface area-to-volume ratios such as fingers, toes and ears are the most susceptible to frostbite.

Two factors influence the development of a cold injury: ambient temperature and wind velocity. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -10°F. As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph.

Additionally, water conducts heat 240 times faster than air. Thus, due to the combined effects of conduction, convection, and evaporation, the body cools suddenly when external chemical protective equipment is removed if the clothing underneath is perspiration-soaked.

Cold injury resulting from cold is included in the generic term "frostbite." There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost nip or incipient frostbite: Characterized by sudden blanching or whitening of skin.

- Superficial frostbite: Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep frostbite: Tissues are cold, pale, and solid, extremely serious injury.

Prevention of frostbite is vital. Keep the extremities warm. Wear insulated clothing as part of one's protective gear during extremely cold conditions. Check for a sign of frostbite at every break. The onset is painless and gradual; you might not know you have been injured until it is too late.

To administer first aid for frostbite, bring the victim indoors and rewarm the areas quickly in water 99° to 100°F. Give individual a warm drink - not coffee, tea, or alcohol. The victim should not smoke. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes, even though the tissue will be very painful as it thaws; then elevate the injured area and protect it from injury. Do not allow blisters to be broken. Use sterile, soft, dry material to cover the injured areas. Keep victim warm and get immediate medical care.

Dehydration, or the loss of body fluids in the cold environment can occur without workers realizing and may increase the susceptibility of workers to cold injury due to significant change in blood flow to the extremities. Warm, sweetened drinks and soup should be provided at the site to provide caloric intake and fluid volume. Caffeine should be limited because of the diuretic and circulatory effects.

4.2.3 ELECTRICAL HAZARDS

Overhead power lines, downed electrical wires, buried cables, and improper use of electrical extension cords can pose a danger of shock or electrocution. All site personnel should immediately report to the HSC or supervisor any condition that could result in a potential electrical hazard.

The HSC or supervisor will notify Site personnel during the safety meetings of the locations of known underground cables and utilities.

Bioassays are not anticipated to be required for the excavation and removal activities proposed, based on levels documented as present. The determination of the need for bioassay will be based on recommendations made by HSSI's personnel.

4.3.4 EMERGENCY MEDICAL TREATMENT

Emergency first aid should be administered on site as appropriate. Treatment of injury is of primary concern and decontamination secondary. The HSC or designee will complete the appropriate incident report, if warranted. Refer to Section 4.4 of the HASP, Accident and Incident Reporting.

An emergency first-aid station will be established and will include a first-aid kit for on-site emergency first aid.

Provisions for emergency medical treatment shall be integrated with the following guidelines:

- At least one individual qualified to render first aid and Cardiopulmonary Resuscitation (CPR) will be assigned to each shift.
- Emergency first-aid stations will be established in the immediate work vicinity.
- Phone numbers and procedures for contacting ambulance services, fire department, police, and medical facilities will be conspicuously posted.
- Maps and directions to medical facilities will be posted.
- Evacuation routes and gathering area locations shall be posted around the Site.

4.4 ACCIDENT AND INCIDENT REPORTING

All accidents, injuries, or incidents will be reported to the HSC. This accident/incident will be reported as soon as possible to the employee's supervisor. An accident/incident form will be completed by the HSC. A copy of the form is included as Form 4.1.

4.2.4 NOISE HAZARD

Operation of equipment may present a noise hazard to workers. Site personnel will utilize hearing protection when noise levels are determined to be in excess of 29 CFR 1910.95 requirements. Noise monitoring will be performed to determine noise levels.

4.2.5 QUANTITATIVE CHEMICAL EXPOSURE

Typical response procedures include:

SKIN CONTACT: Use copious amounts of soap and water. Wash/rinse affected area thoroughly; then provide appropriate medical attention. Eye wash will be provided on site at the work zone and support zone as appropriate. If affected, eyes should be continuously flushed for a minimum of 15 minutes.

INHALATION: Move to fresh air and transport to hospital. Decontaminate as other actions permit.

INGESTION: Transport to emergency medical facility. Decontaminate as permitted by other requirements.

PUNCTURE WOUND OR LACERATIONS: Transport to emergency medical facility. HSC will provide Material Safety Data Sheets (MSDS) to medical personnel as applicable. Decontaminate as permitted by other requirements.

4.2.6 ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the HSC will determine if work can continue without endangering the health and safety of field workers. Some firms to be considered before determining if work should continue are:

- Potential for heat stress and heat-related injuries
- Potential for cold stress and cold-related injuries
- Treacherous weather-related working conditions
- Limited visibility
- Potential for electrical storms or high winds

4.3 MEDICAL EVALUATION AND SURVEILLANCE PROGRAM

All field project personnel will have received a medical evaluation in accordance with 29 CFR 1910.120 prior to commencing work at the site. Medical records for all on-site personnel will be maintained by their respective employers. Personnel may be required to provide the HSC written confirmation that their medical records are up-to-date prior to working at the Site.

4.3.1 DOSIMETRY/PERSONNEL MONITORING

All project personnel shall participate in a dosimetry program administered by the HSSI, a health physics consulting firm located in Morton Grove, Illinois. The dosimetry program shall comply with OSHA 29 CFR 1910.106 and 32 IAC 340.51(R)(6). (i.e. dosimeters shall be processed by a dosimetry processor accredited by the National Voluntary Laboratory Accreditation Program.) HSSI's personnel shall maintain records of all radiation exposures incurred by field personnel. These records will be maintained in an up-to-date manner to comply with the requirements of 32 IAC 340.4010. The HSC shall review the results of personal exposure monitoring to determine compliance with exposure limit requirements.

4.3.2 REQUIREMENT FOR DOSIMETRY

Personal dosimetry is required for anyone who enters a radiologically controlled area in which he/she may receive an average whole-body dose in excess of 10% of the limits in 32 IAC 340. Any person who works in a radiation area will be required to have a personal dosimeter. As a matter of policy, all individuals shall be required to use a dosimeter (either self-reading type, film badge, Thermoluminescence Detector (TLD), or optically stimulated luminescence (OSL)) whenever they enter the exclusion zone.

4.3.3 BIOASSAY

Bioassay is the determination of the types and amounts of radioactive materials, which are inside the body. By analyzing the rate of excretion, the rate of retention, and any other available information regarding placement in the body, internal exposures from radioactive materials can be estimated.

Bioassays are not anticipated to be required for the excavation and removal activities proposed, based on levels documented as present. The determination of the need for bioassay will be based on recommendations made by HSSI's personnel.

4.3.4 EMERGENCY MEDICAL TREATMENT

Emergency first aid should be administered on site as appropriate. Treatment of injury is of primary concern and decontamination secondary. The HSC or designee will complete the appropriate incident report, if warranted. Refer to Section 4.4 of the HASP, Accident and Incident Reporting.

An emergency first-aid station will be established and will include a first-aid kit for on-site emergency first aid.

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- At least one individual qualified to render first aid and Cardiopulmonary Resuscitation (CPR) will be assigned to each shift.
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4.4 ACCIDENT AND INCIDENT REPORTING

All accidents, injuries, or incidents will be reported to the HSC. This accident/incident will be reported as soon as possible to the employee's supervisor. An accident/incident form will be completed by the HSC. A copy of the form is included as Form 4.1.

5.0 TRAINING

All Site personnel shall be trained and certified in accordance with 29 CFR 1910.120.

5.1 PROJECT AND SITE-SPECIFIC TRAINING

Prior to project start-up, all assigned personnel shall receive an initial project-specific and Site-specific training session. This training shall include, but not be limited to, the following areas:

- Basic 40-hour course;
- Review of the Health and Safety Plan;
- Review of applicable radiological and physical hazards;
- PPE levels to be used by Site personnel;
- Site security controls;
- Emergency response and evacuation procedures;
- Project communication;
- Required decontamination procedures;
- Prohibited on-site activities;
- Instructions to workers in accordance with 32 IAC 400.120 and 29 CFR 1910.109;
- U.S. NRC Regulatory Guide 8.13 and Declared Pregnant Worker Policies (Females); and
- Meet the requirements for hazardous waste operations.

During training, project personnel will be provided a copy of the Site Safety Plan. A template copy is provided in Form 5.3.

5.2 VISITOR ORIENTATION

All non-essential personnel and visitors who plan to enter the exclusion zone will be briefed on the HASP requirements and 32 IAC 400.120 Subpart D requirements prior to entry with a trained Site escort. In addition, female visitors will be instructed regarding U.S. NRC Regulatory Guide 8.13 and Declared Pregnant Worker Policies.

5.3 SAFETY TAUGATE MEETINGS

Before the start of the work week, on Monday mornings, a brief safety meeting will be conducted for all Site personnel. The purpose of these meetings will be to discuss project status, problem areas, conditions, safety concerns, PPE levels and to reiterate HASP requirements. The HSC will complete a Safety Meeting Report (Form 5.1) to indicate the contents of the meeting and the attendees.

5.4 FIRST AID

At least one (1) individual, trained and qualified to administer first aid and CPR in accordance with American Red Cross or American Heart Association requirements, will be present at the Site.

5.5 SAFE WORK PERMIT

Site workers in special work conditions such as confined space, hot work, trenching, or other physical hazards, must be skilled at such work and trained to recognize these as special work conditions. If the above conditions become necessary, they will be accomplished under a Safe Work Permit program. Confined space is defined by OSHA 1910.146. Section 1301 of this HASP contains further information on the Confined Space Program. A Confined Space Entry Permit is included as Form 13.1.

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6.0 COMMUNICATIONS

6.1 GENERAL COMMUNICATIONS

The Site will have available the means for telephone or equivalent communications, for summoning emergency assistance from the fire/ambulance and police departments in the event they are required. The telephone will also act as a direct link to technical personnel for information pertaining to all phases of the project.

6.2 RADIO/TELEPHONES

Short-range walkie-talkies or cellular telephones may be made available to designated personnel working at the Site.

6.3 EMERGENCY WARNING

In the event of an emergency condition, the HSC will notify project personnel verbally, if all are within immediate hearing, and via a bullhorn if required. The HSC will also notify visitors present within the area. Site personnel will immediately proceed to a pre-designated assembly area during the daily safety meeting. Personnel will remain in the designated area until further instructions are received by the HSC.

All communication equipment will be tested at the beginning of each day to verify operational integrity.

6.4 HAND SIGNALS

Hand signals will be used by field personnel in conjunction with the buddy system. Hand signals shall be familiar to all field personnel before operations commence and should be reviewed during Site-specific training.

Signal	Meaning
Hand gripping throat	Out of air; can't breathe
Grip partner's wrist	Leave area immediately; no debate
Hands on top of head	Need assistance
Thumbs up OK	I'm all right; I understand.

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Thumbs down

No, negative

6.5 SITE SECURITY

Only authorized personnel will be permitted on the Site in accordance with the requirements of this HASP. Visitors and other non-essential personnel may enter the work area in accordance with the controls set forth in Appendix B.

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7.0 PERSONNEL EXPOSURE AND AIR QUALITY MONITORING

7.1 AIR QUALITY (DUST)

Due to the nature of the principal contaminants associated with the project, dust suppression will be important as a means of minimizing exposure levels and off-site migration of contaminants. The HSC will routinely monitor the project area. The OSHA personal exposure limit (PEL) for respirable dust is 15 mg/m³ (total), 5 mg/m³ (resp.).

7.2 AIRBORNE RADIOACTIVITY MONITORING

Monitoring for airborne radioactivity exposure requires the following elements:

- Air sampling for radioactive particulates.
- Recordkeeping regarding personnel work locations and time in location, and
- Respiratory protective equipment records regarding devices used by workers in airborne radioactivity areas.

By closely monitoring these three elements, a continuous record of personnel exposure to airborne radioactivity is maintained. RSSI has been selected to conduct occupational exposure sampling of personnel and environmental monitoring of the work areas for airborne radioactivity. A copy of RSSI's Radiological Health and Safety Plan (RHASP) is included as Appendix M.

Personal air samplers may be utilized for airborne radioactivity monitoring. Air filters shall be analyzed on a daily basis to determine potential contributions to dose from radionuclides. It is expected that naturally occurring radon and thorium daughters will interfere with analyses. Additional evaluation of samples shall be performed when determined necessary based upon elevated results. Such analyses shall be performed after allowing time for decay of short-lived radionuclides. Results shall be compared with the limits in Table 1, Column 1 of Appendix B to 10 CFR 20 effective July, 1970.

Perimeter monitoring of the exclusion areas for radioactive particulate activity also will be performed. Environmental monitoring results shall be compared with the limits in Table 2, Column 1 of Appendix B to 10 CFR 20 effective January 1, 1994. High volume air samplers shall run continuously during operations and be evaluated on a daily basis for gross alpha activity. Comparisons will be made to 32 IAC 340 Appendix A to ensure that adequate radiological controls are in place for workers and the general public. As

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low as reasonably achievable (ALARA) concepts will be utilized when considering protective measures to ensure that internal exposures are minimized, while also considering the effects of such protective measures with respect to external exposures. Controls on the Site, such as wetting of soils and procedural changes, will be employed prior to the prescription of respiratory protective equipment.

7.3 INTERNAL MONITORING

Internal monitoring to determine intakes of radioactive material will be performed as needed, based upon the results of the air sampling program. Bioassay methods to be considered should include in-vivo, as well as in-vitro, assessments. Routine bioassay of workers is not anticipated based upon the low concentrations of radioactivity in soils to be excavated.

7.4 EXTERNAL RADIATION MONITORING

External radiation monitoring of workers will be performed using film, TLD or CSE. Dosimetry will be provided and processed by a service holding National Voluntary Laboratory Accreditation Program (NVLAP) certification. Pocket dosimeters may also be utilized for visitors and other infrequent personnel requiring access to the Site.

7.5 RADIOLOGICAL SURVEYS

Radiological surveys will be performed to ensure that radiation levels and contamination levels are under regulatory limits for workers and the general public.

7.6 CONTAMINATION MONITORING

Surveys shall be conducted in work areas to ensure that radioactivity is below acceptable levels. Decontamination of elevated areas will be performed to maintain radioactivity at levels that are as low as reasonably achievable (ALARA).

Before leaving the exclusion zone, Site personnel shall be checked to ensure that contamination is not present on skin or clothes. The HSC will be immediately informed regarding any contamination on individuals and will initiate appropriate

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decontamination techniques. Proper disposition of contaminated personal effects and clothing also will be overseen by the HSC.

7.7 ACTION LEVELS

7.7.1 RADIOLOGICAL ACTION LEVELS

Radiological action levels for on-site workers will be determined by airborne particulate monitoring for the presence of radioactivity. RSSI will perform radiological monitoring. The radioactive contamination on the Site is particulate and insoluble in water. Therefore, there will be no fixed contamination on the workers. Action levels as determined by radioactive monitoring can be found in Table 7.1.

To avoid the need for upgrade of personal protection equipment due to airborne contamination, engineering controls such as the use of water to minimize dust levels will be implemented as necessary during excavation and restoration activities.

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8.0 PERSONAL PROTECTIVE EQUIPMENT

It is anticipated that most excavation activities in designated exclusion zones can be conducted to Level D personal protective equipment (PPE), with a contingency upgrade to Level C. Level C will be used when required by special work permits, or when directed by the HSC.

Level D personal protective clothing and equipment for excavation activities includes:

- Coveralls
- Hard hat
- Chemical resistant, OSHA approved safety shoes/boots
- Cotton or leather gloves
- Safety glasses

Level C protective clothing and equipment includes:

- Full-face air-purifying respirator (NIOSH approved) fitted with radionuclides/HEPA cartridges (P100) and/or organic vapor cartridges, depending on which hazards are expected
- Coveralls
- Tyvek coveralls - required in areas when splashing by contaminated soils or water is a possibility
- Cotton or leather gloves
- Disposable latex inner gloves - required in areas when splashing by contaminated soils or water is a possibility
- Nitrile outer gloves (lined) - required in areas when splashing by contaminated soils or water is a possibility
- Chemical-resistant steel toe boots
- Hard hat

Action levels used to determine the need to upgrade or downgrade the levels of protection are described in Section 7.0 of this HASP.

10.0 GENERAL WORK PRECAUTIONS

10.1 GENERAL WORK PRECAUTIONS

The following general work precautions apply to all site personnel:

- Eating, drinking, chewing gum, or tobacco smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the work area
- Hands and face must be thoroughly washed upon leaving the work area. Wash water will be provided at the site for this purpose
- Whenever levels of radioactivity warrant, the entire body should be thoroughly washed, as soon as possible, after the protective coveralls and other clothing are removed as part of the decontamination process
- No facial hair that interferes with a satisfactory fit of the mask-to-face seal is allowed on personnel required to wear respirators
- Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, biohazards, discolored surfaces, knees on ground, lean, sit, or place equipment on drums, containers, or the ground
- Medicine, drugs and alcohol may interfere with or impair judgment and reaction times. Therefore, usage of prescription and non-prescription drugs must be specifically approved by a qualified physician and made known to the HSC prior to an individual's presence on the work-site. Alcoholic beverage intake is strictly prohibited at the site and prior to work
- All personnel must be familiar with standard operating procedures and any additional instructions and information contained in the HASP
- All personnel must adhere to the requirements of the HASP
- Contact lenses may be worn with a full-face respirator provided person doing so informs his supervisor or the Site HSC; they are not otherwise permitted when respiratory protection is required or where the possibility of a splash exists
- Personnel must be cognizant of symptoms for radiological exposure on site, for heat stress and cold stress, and knowledgeable regarding emergency measures contained in the Emergency Plan
- Respirators shall be cleaned and disinfected after each day's use or more often, if necessary

9.0 CONTAMINATION REDUCTION PROCEDURES

9.1 EQUIPMENT

Portable equipment will be decontaminated with soap and water and rinsed with tap water. Heavy equipment will be cleaned with water and, if necessary, a detergent solution. It is not anticipated that chemical cleaning will be necessary for decontamination. Additional decontamination procedures can be found in Appendix I.

9.2 PERSONNEL

If levels of radioactivity show that individuals can remove coveralls and other personal protective clothing and equipment before leaving the work site and, thus, complete decontamination, the individuals may leave the Site. If, however, levels of radioactivity show that individuals cannot achieve decontamination by the removal of coveralls and showering is required, they will be dressed in clean coveralls, boots and gloves and be transported to Northwestern Memorial Hospital to complete decontamination.

If substantial skin contamination occurs on an individual working with radioactive materials, the following specific procedures should be followed to prevent fixation of the material in the skin or absorption of the radioactivity through the skin.

Immediate Action: Notify the HSC or designee, who will supervise the decontamination. If contamination is sparse, the HSC or designee will supervise the cleaning of the individual spots with soap and/or water. If the contamination is general, the HSC or designee may recommend washing the area gently in warm or cool water (not hot) using hand soap (not detergent) for one minute. Rinse, dry, and monitor for radioactivity. This soap/wash step may be repeated three times.

Evaluation: If the above procedure fails to remove all the skin contamination, the treatment should cease. An evaluation of the skin contamination should be performed by the HSC or designee including an estimate of the dose commitment to the skin, and the quantity and identity of the nuclides contaminating the skin. If additional decontamination steps are necessary, they are performed and documented by the HSC. The guidelines for personnel decontamination in the Radiological Health Handbook, NRC 1970, beginning on page 194, can be used as applicable. These guidelines are supplied in Appendix E. **CAUTION:** Do not use chemicals for personnel decontamination until full evaluation of the contamination is made by the HSC or designee.

- Prior to donning, respirators shall be inspected for worn or deteriorated parts. Emergency respirators or self-contained devices will be inspected at least once a month and after each use
- Each employee shall be familiar with the project's Respiratory Protection Program (Appendix I).

10.2 OPERATIONAL PRECAUTIONS

The following operational precautions must be observed at all times

- All Site personnel shall be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications
- All required respiratory protective devices and clothing shall be worn by all personnel going into areas designated for wearing protective equipment
- All Site personnel shall use the buddy system when wearing respiratory protective equipment. At a minimum, a third person, suitably equipped as a safety backup, is required during extremely hazardous entries
- During continual operations, on-site workers act as a safety backup to each other. Off-site personnel provide emergency assistance
- Personnel should practice any unfamiliar equipment prior to undertaking the actual procedure
- Entrance and exit locations shall be designated and emergency escape routes delineated. Warning signals for Site evacuation must be established
- Personnel and equipment in the contaminated work area should be minimized, consistent with effective Site operations
- Work areas for various operational activities shall be established
- Procedures for leaving a contaminated area shall be planned and implemented prior to going on site. Work areas and decontamination procedures shall be established based on expected Site conditions
- Frequent and regular inspection of Site operations will be conducted to ensure compliance with the HASP. If any changes in operation occur, the HASP will be modified to reflect these changes

9.3 CONTAMINATION PREVENTION

Work practices that minimize the spread of contamination will reduce worker exposure and help ensure valid sample results by preventing cross-contamination. Procedures for contamination avoidance include:

- knowing the limitations of all personal protective equipment being used
- avoiding walking through areas of obvious or known contamination
- refraining from handling or touching contaminated materials directly (do not sit or lean on potentially contaminated surfaces)
- ensuring personal protective equipment has no cuts or tears prior to donning
- fastening all closures on suits, covering with tape if necessary
- taking steps to protect against any skin injuries
- storing supplies of airborne contaminants, and
- refraining from eating, chewing gum, smoking, or engaging in any activity from which contaminated materials may be ingested while in contaminated areas

9.4 DISPOSAL PROCEDURES

All discarded materials, waste materials, or other field equipment and supplies will be handled in such a way as to prevent the spread of contamination, creating a sanitary hazard, or causing litter to be left on site. All potentially contaminated waste materials (e.g., clothing, gloves) shall be monitored and segregated in accordance with monitoring results into either radioactive or non-radioactive waste. Appropriate labels shall be affixed to all containers of radioactive materials.

11.0 SANITARY FACILITIES

11.1 POTABLE WATER

- An adequate supply of potable drinking water shall be maintained at all times immediately outside the Site. Drinking water shall meet all federal, state and local health requirements.
- Drinking water shall be supplied to project personnel via approved dispensing sources.
- Paper cups shall be permitted for the drinking of potable water supplies.
- Drinking water dispensers shall be clearly marked and shall, in no way, leave the potential for contamination from non-potable supplies.
- Site personnel must be fully decontaminated prior to approaching the drinking water supply.

11.2 TOILET FACILITIES

- Adequate toilet facilities shall be provided at the Site.
- These facilities shall be in the form of portable chemical toilets.
- Routine servicing and cleaning of the toilets should be established with the vendor and contractor and shall be in accordance with federal, state, and local health regulations.
- Site personnel must be fully decontaminated prior to approaching the toilet facilities.

11.3 WASHING AREAS

- Adequate washing areas shall be provided for personnel use within the work area.
- Washing areas shall be maintained in a sanitary condition and will be provided with adequate supplies of soap, towels for drying, and covered waste receptacles.
- Washing areas shall be maintained and sanitized daily.
- No eating, drinking or smoking shall be permitted in the work area. This policy will be strictly enforced by the HSC.

12.0 FIRE CONTROL EQUIPMENT

An adequate number of approved portable fire extinguishers (class rated A, B and C) shall be readily available at the Site at all times.

All Site personnel shall be trained in the use of the extinguishers. Extinguishers shall only be used on outbreak, slope fires or fires of minor nature. The local fire department shall be contacted in the event of a larger fire.

13.0 CONFINED SPACE ENTRY PROCEDURES

13.0.1 SAFETY WORK PERMIT REQUIRED

All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. The Confined Space Entry Permit (Form 13.1) for entry into a confined space must be completed before work begins; it is a critical component of the items necessary for confined space entry. The permit will be kept at the Site for the duration of the confined space work. If there is an interruption of work, or the alarm conditions change, a new permit must be obtained before work begins.

A permit is not required when the space can be maintained for safe entry by 100% fresh air mechanical ventilation. This must be documented and approved by the HSC. Mechanical ventilation systems, where applicable, shall be set at 100% fresh air.

The HSC must certify that all hazards have been eliminated on the Confined Space Entry Permit. If conditions change, a new permit is required.

13.0.2 PRE-ENTRY TESTING FOR POTENTIAL HAZARDS

a. Surveillance

Personnel first will survey the surrounding area to assure the absence of hazards such as contaminated water, soil, or sediment, barrels, tanks, or piping where vapors may drift into the confined space.

b. Testing

No personnel will enter a confined space if any one of these conditions exists during pre-entry testing.

Determinations will be made for the following conditions:

1. Presence of toxic gases or dusts: equal to or more than 5 parts per million (ppm) on a photo-ionization unit with an alarm, above background outside the confined space area; or other action levels for specific gases, vapors, or dusts as specified in the Health and Safety Plan and the Confined Space Permit based on knowledge of Site conditions;

13.0 CONFINED SPACE PROGRAM

13.0.1 PURPOSE

In the event that confined space work is a necessity, a Confined Space Program will be implemented. Training in the recognition of confined spaces is a component of the health and safety training program.

The purpose of the Confined Space Program is to establish procedures to protect personnel from this serious hazard in the course of their work; and at a minimum, to comply with 29 CFR OSHA 1910.146. This document assigns responsibilities and sets standards for personnel engaged in activities where confined spaces may be present.

13.0.2 RESPONSIBILITIES

13.0.2.1 HEALTH AND SAFETY COORDINATOR

The Health and Safety Coordinator administers the Confined Space Program. The Health and Safety Coordinator's responsibilities include:

- Review of the HASP for potential confined space hazards and design alternative approaches to accomplish the confined space tasks;
- Coordinating and managing the Confined Space Program in the event one is required;
- Establishing priorities for implementation of the program;
- Assisting with recognition and implementation of the Confined Space Program;
- Advising project management on confined space issues; and
- Communicating the Confined Space Program to personnel by training related to specific Site activities.

13.0.2.2 SITE MANAGER

The Site Manager directs the application of the Confined Space Program to project work. The Site Manager is responsible for:

- Working with the HSC to prepare information describing activities that might be conducted in a confined space area;

2. Presence of explosion/flammable gases: equal to or greater than 10% of the Lower Explosive Limit (LEL) as measured with a combustible gas indicator or similar instrument (with an alarm); and
3. Oxygen Deiciency: A concentration of oxygen in the atmosphere equal to or less than 19.5% by volume as measured with an oxygen meter.

Pre-entry test results will be recorded and kept at the Site for the duration of the job by the HSC. Affected personnel can review the test results.

c. Authorization

Only the HSC or designee can authorize any personnel to enter into a confined space. This is reflected on the Safe Work Permit for entry into a confined space. The HSC must assure that conditions in the confined space meet permit requirements before authorizing entry.

d. Safe Work Permit

A Safe Work Permit for confined space entry must be filled out by the HSC or designee. A copy of the Safe Work Permit is included as Form 5.2.

e. Attendants

One worker will stand by outside the confined space ready to give assistance in the case of an emergency. Under no circumstances will the standby worker enter the confined space or leave the standby position. There shall be at least one other worker not in the confined space within sight or call of the standby worker.

f. Observation and Communication

Communications between standby worker and entrant(s) shall be maintained at all times. Methods of communication that may be specified in the Safe Work Permit and the HASP may include voice, voice by powered radio, tapping or rapping codes, signaling tugs on rope, and standby worker's observations that activity appears normal.

- Assuring that all personnel engaged in project activities are familiar with the definition of a confined space; and
- Assuring that personnel are familiar with the Confined Space Program, and that project activities are conducted in compliance with the Confined Space Program

13.0.3 PERSONNEL

Personnel are responsible for:

- Overseeing implementation of the Confined Space Program during field operations;
- Reporting confined space work activity, and any violations of the Confined Space Program, to the Site Manager and the HSC;
- Familiarizing themselves with the Confined Space Program and following it;
- Becoming familiar with the criteria for determining a confined space, and with the monitoring, permitting, and other requirements of the program; and
- Reporting immediately a confined space condition to the HSC.

13.0 DEFINITION OF A CONFINED SPACE

Confined space is one that:

- Is large enough and so configured that an employee can badly enter and perform assigned work;
- Has limited or restricted means for entry or exit (such as pits, storage bins, hoppers, crawl spaces, and storm cellar areas); and
- Is not designed for continuous employee occupancy.

Any workspace meeting all of these criteria is a confined space and the Confined Space Program must be followed.

13.0.3 RESCUE PROCEDURES

Acceptable rescue procedures include entry by a team of rescuers only if the appropriate self-contained breathing apparatus (SCBA) is available, or use of public emergency services. The standby worker must be trained in first aid, CPR, and respirator use. A first aid kit should be on hand and ready for emergency use. The standby worker must be trained in rescue procedures. Retrieval of an unconscious victim in a confined space will only be conducted by trained rescue personnel. An emergency call to 911 will be initiated to assist the victim.

13.0 TRAINING

Personnel who will engage in field activities will be given annual training on the requirements and responsibilities in the Confined Space Program and on OSHA 1910.146. Only trained personnel can work in confined spaces. Workers should be experienced in the tasks to be performed, instructed in proper use of respirators, lifelines and other equipment, and practice emergency procedures and self-rescue.

Before each Site activity, the determination of confined space work will be part of the Site characterization process. Training in the Site-specific confined space activities will be part of the Site-specific health and safety training.

13.0 SAFE WORK PRACTICES

- Warning signs should be posted. These include warnings for entry permits, respirator use, prohibition of hot work and emergency procedures and phone numbers.
- Cylinders containing oxygen, acetylene or other fuel such as gasoline must be removed a safe distance from the confined space work area.
- Purging and ventilating is done before work begins to remove hazardous vapors from the space. The space should be monitored to ensure that the gas used to purge the space (e.g. tank) has also been removed. Local exhaust should be used where general exhaust is not practical.
- The buddy system is used at all times. A standby person always must be posted within sight of, or in communication with, the person inside the confined space. The standby should not enter the confined space, but instead will call for help in an

- emergencies, and not leave the post. Communication should be maintained at all times with workers inside the confined space.
- Emergency planning in the HASP and a Safe Work Permit must be approved in advance and the proper rescue equipment must be immediately available.

14.0 ELECTRICAL SAFETY

14.1 EQUIPMENT/ELECTRICAL HAZARDS

Electricity may pose a particular hazard to Site workers due to the use of portable electrical equipment. When electrical work is needed, it must be performed by a qualified electrician.

General electrical safety requirements are outlined in Appendix K and include:

- all electrical wiring and equipment must be a type listed by Underwriters Laboratory (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency;
- all installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or United States Coast Guard regulations;
- portable and semi-portable tools and equipment must be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle;
- tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double insulated tools must be distinctly marked and listed by UL or FM;
- live parts of wiring or equipment must be guarded to prevent persons or objects from touching them;
- electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching;
- all circuits must be protected from overload;
- temporary power lines, switch boxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage;
- plugs and receptacles must be kept out of water unless of an approved submersible construction;
- all extension outlets must be equipped with ground fault circuit interrupters (GFCIs);
- attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment;

- extension cords or cables must be inspected prior to each use, and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire;
- flexible cords must be used only in continuous lengths without splice, with the exception of molded or customized splices made by a qualified electrician; and
- Electrical Safety will be adhered to as minimum requirements to be followed by all Site personnel, including subcontractors. Electrical inspections are to occur during initial Site setup and monthly thereafter. Those inspections are to be documented via either the Superintendent's logbook, the Site HSC's logbook.

14.2 LOCKOUT/TAGOUT

The HSC or designee must approve all work in areas requiring lockout/tagout procedures. Specific procedures and permitting requirements will be specified in the HASP, or in a revised HASP based on the need for a worker to work around electrical equipment.

All systems must be locked out and tagged before the work begins. This includes pipes, air lines, electrical equipment and mechanical devices. The equipment must be start tested and approved for use by a worker by the HSC or designee by start-testing to make sure the locked-out equipment does not operate.

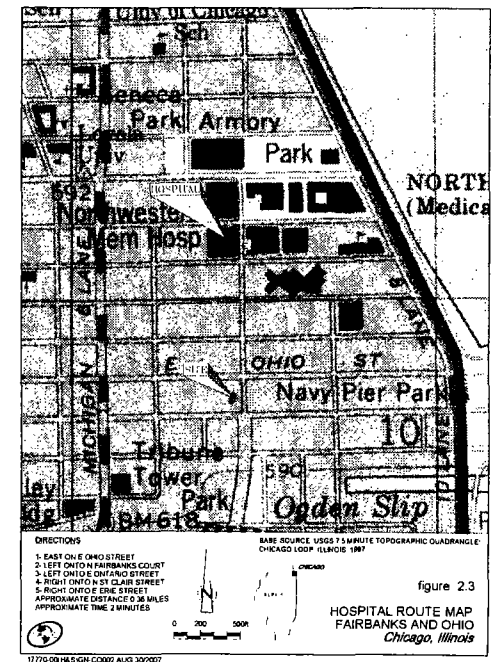
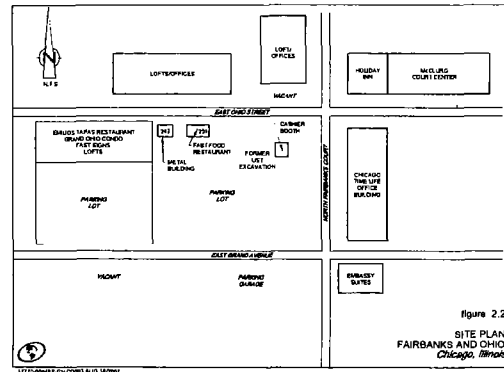
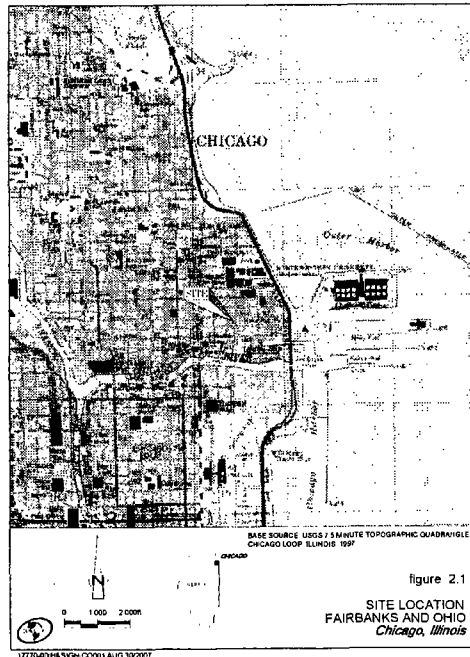


TABLE 1.0
EMERGENCY PHONE NUMBERS
IN THE EVENT OF AN EMERGENCY DIAL 911

AMBULANCE SERVICE	911
FIRE DEPARTMENT	911
EMERGENCY RESCUE SERVICE	911
POLICE DEPARTMENT	911
NATIONAL RESPONSE CENTER	1-800-424-8802
POISON CONTROL CENTER	1-800-772-2200
NEAREST HOSPITAL - NORTHWESTERN MEMORIAL HOSPITAL	1-312-926-5188
ILLINOIS DEPARTMENT OF NUCLEAR SAFETY (IDNS) EMERGENCY NUMBER	(312) 785-0600
PROJECT COORDINATOR	
ILLINOIS EMERGENCY MANAGEMENT	(312) 792-7860
US EPA REGION V - 24-HOUR EMERGENCY NUMBER	(312) 353-2318

TABLE 1.1
COMBUSTIBLE GAS CONCENTRATION
EAST OHIO STREET AND FAIRBANKS COURT
CHICAGO, ILLINOIS

Component or Compound	Intoxication Symptoms	Maximum Detected in prior Emergency Incidents (PPH)	Maximum Detected in prior Incidents (PPH)	Exposure Route	2015 AUG. 15 to 27th	2015 SEP. 15 to 27th	2015 OCT. 15 to 27th	2015 NOV. 15 to 27th
Benzene	9.24 g/l	1.5	0.002	Inhalation, Skin, Ingestion	0.5	2.5	1	5
Electrolyte	4.7 g/l	5.0	1.7	Inhalation- Ingestion	100	125	100	None
Toluene	4.82 g/l	4.73	3.81	Inhalation, Skin, Ingestion	40	None	30	None
Xylene (m-p)	5.44 - 5.56 g/l	21.87	12.5	Inhalation- Ingestion	100	150	100	None

TABLE 1.2
ACTION LEVELS AS DETERMINED BY RADIOACTIVITY

Note: Personnel shall not be exposed to airborne radioactivity such that their weekly intake exceeds 12 Maximum Permissible Concentration (MPC) hours without prior approval of the Field Team Leader or designer. The MPCs are the inhalation values used in 29 CFR 1910.1096. The inhalation values incorporated in 29 CFR 1910.1096 are those that were in 10 CFR 20 in 1971 when OSHA promulgated the standard. Level of protection may be increased to Level C (full-face air purifying respirator) when airborne monitoring indicates that airborne concentration of radioactive material reached 50% of the MPC. All assessments shall incorporate ALARA principles. Engineering controls shall be used prior to assignment of respiratory protective equipment.

Areas where airborne radioactivity levels exceed, or have a reasonable potential to exceed, 25% of the MPC averaged over one week, or exceeds the MPC at any time shall be posted "Caution Airborne Radioactivity Area."

Radiation Type	Action Level	Level of Respiratory Protection/Action
a. Contamination on smear samples	0.5 times the levels in Table 2.3 ^a in Unrestricted Areas or 3 times the level in Restricted Areas	Consider contamination control
b. Airborne Radioactivity	12 MPC hours in a week	Consider Level C (full-face APF) based upon ALARA evaluation ^d . Ensure proper posting. Consider internal monitoring.
c. Ambient Gamma (work areas)	5 mrem/hr ^e or 100 mrem in a week	Consider procedures for shielding of walls. Ensure proper posting.
d. Ambient Gamma (off-site areas)	1 mrem/hr ^e or 50 mrem in a year	Implement immediate controls to reduce dose equivalent rate.

- Notes:
- The values in Table 7.2 are from 32 IAC 340 APPENDIX A Decontamination Guidelines.
 - (a) Potential Airborne Radioactivity Area as defined in 29 CFR 1910.1096 (e)(4). Workers exposed to 32 MPC-hours in a week must wear modified Level C (full-face APF) until the end of the work.
 - The ambient gamma dose equivalent rate action level of 5 mrem/hr is from 29 CFR 1910.1096 (f)(3)(ii) Radiation Area definition. If the ambient gamma dose equivalent rate reaches 2 mrem/hr, one or more of the following actions may be implemented: The source may be shielded; the working distance from the source may be increased; or the worker's exposure time may be limited.
 - The ambient gamma action level for off-site is based upon the 32 IAC 340 Subpart D requirements to maintain dose equivalent in unrestricted areas such that they do not exceed 0.025 rem in any one hour or 0.1 rem in any one year.

TABLE 1.7.2
ACTION LEVELS

The values listed in 32 IAC 340 APPENDIX A Decontamination Guidelines are used in determining that areas are suitable for release for unrestricted use. The APPENDIX A Surface Contamination Guide values for alpha emitters are reproduced below.

Alpha emitters			
Removable	555 mBq per 100 cm ² = 15 pCi per 100 cm ² 33 dpm per 100 cm ²	average over any one surface	
	1.67 Bq per 100 cm ² = 45 pCi per 100 cm ² 100 dpm per 100 cm ²	maximum	
Total (fixed)	16.7 Bq per 100 cm ² = 450 pCi per 100 cm ² 1,000 dpm per 100 cm ²	average over any one surface	
	83.3 Bq per 100 cm ² = 2,250 pCi per 100 cm ² 5,000 dpm per 100 cm ²	maximum	

TABLE 9.1
ON-SITE AIR MONITORING PROGRAM ACTION LEVELS
EAST OHIO STREET AND FAIRBANKS COURT
CHICAGO, ILLINOIS

MONITORING DEVICE	ACTION LEVEL	ACTION
Combustible Gas Indicator	>10 Percent LEL	Close operations and move to a safe place. Notify HSC. Do not continue working until conditions are constantly below 10 percent of the LEL.
Oxygen Meter	< 19.5 Percent or > 23.5 Percent	Close operations and move to a safe place. Notify HSC. Do not continue working until oxygen levels are between 19.5 and 23.5 percent.
Photoionization Detector (PID)	Benzene present in the Work Zone: <10 ppb or Background 10 ppb and ≤ 25 ppb > 25 ppb and ≤ 500 ppb ≥ 500 ppb Benzene NOT present in the Work Zone: <10 ppb or Background ≥ 10 ppb and ≤ 250 ppb ≥ 250 ppb and ≤ 1000 ppb ≥ 1000 ppb	Full-face respirator available Full-face, air purifying respirator Level C PPE Supplied air respirator, Level B PPE. Implement additional engineering controls. Shut down activities. Notify HSC. Implement additional engineering controls. Full-face respirator available Full-face, air purifying respirator Level C PPE Supplied air respirator, Level B PPE. Implement additional engineering controls. Shut down activities. Notify HSC. Implement additional engineering controls.

TABLE 9.1
ON-SITE AIR MONITORING PROGRAM ACTION LEVELS
EAST OHIO STREET AND FAIRBANKS COURT
CHICAGO, ILLINOIS

MONITORING DEVICE	ACTION LEVEL	ACTION
Dust / Particulate	<5 mg/m ³ or Background ≥ 5 mg/m ³ and < 50 mg/m ³ ≥ 50 mg/m ³	Full-face respirator available Full-face, air purifying respirator Level C PPE. Supplied air respirator, Level B PPE. Implement additional engineering controls.
Hydrogen Sulfide	> 5 ppm	Shut down activities. Notify HSC. Implement additional engineering controls.
Carbon Monoxide	> 35 ppm	Shut down activities. Notify HSC. Implement additional engineering controls.

- Notes:
- HSC - Health and Safety Coordinator
 - LEL - Lower Explosive Limit
 - PPE - Personal Protective Equipment
 - ppm - Parts per million

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APPENDIX A

PROJECT OVERVIEW

- Removal of asphalt, and walkover survey for presence of impacted soil / fill
- Shoring / shoring and excavation, staging and removal of impacted soil / fill to depth
- Confirmatory soil sampling and analysis
- Backfilling and Site restoration and
- Project close-out.

The scope of work includes the following major activities:

- mobilization and Site control which includes mobilization of equipment and personnel, installation of temporary fencing, the construction of Site facilities, and work zone controls;
- Site setup which includes clearing of Site, location and destruction of Site utilities, removal of existing Site features, and demolition of structures;
- removal of asphalt and walkover survey of underlying soil / fill material;
- excavation, segregation, temporary stockpiling and testing / sampling of soil / fill material from within the Site area;
- post-excavation testing / sampling;
- material handling and disposal of the following:
 - demolition debris
 - asphalt
 - contaminated soil / fill material
 - un-contaminated soil / fill material (unsuitable for use as backfill)
 - waste water
 - water from excavations
 - general refuse
- backfill placement and compaction activities;
- decontamination activities; and
- demobilization activities.

During a portion of the remediation activities, personnel may come in contact with soil / fill material, water, and waste materials, which potentially contain radioactive or hazardous substances. This section has been developed to ensure the following:

- that CRA Site personnel are not adversely exposed to the compounds of concern;
- that public health and environment are not adversely impacted by materials that are encountered and handled during project activities at the Site;
- compliance with applicable governmental and non-governmental (American Conference of Governmental Industrial Hygienists (ACGIH) regulations and guidelines. In particular, the amended rules of the Occupational Safety and Health Administration (OSHA) for Subpart D of Part 1926 (Title 29 Code of Federal Regulations (CFR) Part 1926.65) will be implemented for Site work where there is a potential to come in contact with hazardous substances and 29 CFR 1910.1096 for radioactive substances; and
- initiation of proper emergency response procedures to minimize the potential for any adverse impact to Site workers, the general public, or the environment

For the purpose of this HASP, activities performed on Site involving contact with material containing potentially hazardous chemicals will be considered a contaminated operation requiring Personal Protective Equipment (PPE) until determination that a lower level of protection is warranted.

Contractors and subcontractors shall develop HASP's specific to their SCOW in accordance with the EPA approved Site HASP available at the web address www.epa.gov/Region5/sites/lincolnlight/pdf/lincolnlght_healthplan.pdf. Certain activities at this Site where personnel will not have the potential for contact with contamination and no potential for exposure exists will be exempt from all provisions of the standards (29 CFR 1926.65 or 29 CFR 1910.120), including the medical and training requirements.

All CRA activities at the Site will be conducted in accordance with provisions of this approved Site-specific HASP. A copy of this HASP and any CRA-specific Standard Operating Procedures (SOPs) will be maintained at the Site whenever activities are in progress.

1.2 PROJECT ORGANIZATION

The remedial activities will be undertaken by a remedial contractor, selected by the client group. Oversight of the remedial contractor's activities will be undertaken by CRA. Both the remedial contractor and CRA will enlist subcontractor support, as needed.

1.0 PROJECT OVERVIEW

The Site consists primarily of an approximately 32,700-square foot asphalt-paved drive-past parking lot located at the southwest corner of East Ohio Street and North Karlovsky Court in Chicago, Illinois. Improvements to the Site include three buildings including a fast-food restaurant (Hot Diggity Dog), a vacant metal building, and an attendant's booth for the parking lot attendants.

The Site is located in close proximity to the Lindsay Light Superfund Site and the Lindsay Light II Site where soils containing radioactive thorium have been previously reported. The Lindsay Light Chemical Company is the former maker of incandescent gas mantles for home and street lighting. Based on documentation reviewed by CRA, the Lindsay Light Chemical Company manufactured mantles circa 1910 until 1933 at 161 East Grand Avenue. The process of gas mantle manufacturing involves dipping gauze mantle bags into solutions containing thorium nitrate and small amounts of cerium, barium and magnesium nitrates. The principal ingredient in thorium nitrate is radioactive thorium, specifically thorium-232.

The presence of fill material at the Site, which was potentially impacted by the historic operations at the Lindsay Light Superfund Site, was suspected by USHPA. Investigations revealed the presence of above background levels of radiation in certain areas of the Site. The USHPA concluded that none of these areas pose an immediate health hazard; however, the risk for contamination of people and equipment would rise appreciably if the asphalt were removed.

Table 2.1 of the HASP, presents the maximum detected concentration of chemical compounds of concern in Site soils and groundwater. The exposure routes and regulatory time-weighted averages (TWA) exposure levels for the compound of concern are also listed in Table 2.1. These levels are set to protect the health of workers.

1.1 OVERVIEW

The suggested general sequence of activities, are as follows:

- Preparatory work, including obtaining required permits and approvals, and utility clearances;
- Mobilization of materials, equipment and temporary support facilities;
- Site surveying, clearing existing structures and fence removal;

The selected remedial contractor will be responsible for providing both a Site Superintendent and a Health and Safety Coordinator (HSC) to direct their activities, and those of their subcontractors. These individuals will be responsible for ensuring that all contract specifications are met, including those related to Site health and safety.

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APPENDIX H

SITE CONTROL

1.0 SITE CONTROL

1.1 AUTHORIZATION TO ENTER

All personnel working in Exclusion Zones (EZs) must have completed hazardous waste operations initial training as defined under OSHA Regulation 29 CFR 1926.65, have completed their initial training or refresher training within the past 12 months, and have been certified by a physician as fit for hazardous waste operations in order to enter a Site area designated as an EZ or Contamination Reduction Zone (CRZ). Personnel without such training or medical certification may enter the designated Support Zone (SZ) only. The HSC will maintain a list of authorized persons; only personnel on the authorized persons list will be allowed within the EZ or CRZ.

1.2 SITE ORIENTATION AND HAZARD BRIEFING

No person will be allowed in the general work area during Site operations without first being given a Site orientation and hazard briefing. This orientation will be presented by the HSC, and will consist of a review of this HASP. This review will cover the radiological, chemical, and physical hazards, protective equipment, safe work procedures, and emergency procedures for the project. Form 5.1 of the HASP provides a SAFETY MEETING REPORT that acts as a training acknowledgment form for documentation purposes. In addition to this meeting, Daily Safety Meetings will be held each day before work begins. All people on the Site, including visitors, must document their attendance to this briefing as well as the Daily Safety Meetings on the forms included with this HASP. Form 5.1 may also serve as the Daily Safety Meeting Log.

1.3 CERTIFICATION DOCUMENTS

Should unanticipated hazardous chemicals be discovered on the Site, training and medical files will be established for the project and kept on Site during all Site operations. The 40-hour training, update, and respirator fit test certificates, as well as current medical clearance for all project field personnel, will be maintained within that file. Site personnel shall provide their training, respirator fit test and medical documentation to the HSC prior to the start of field work.

CONESTOGA-ROVERS & ASSOCIATES

CONESTOGA-ROVERS & ASSOCIATES

1.4 ENTRY LOG

A log-in/log-out sheet must be maintained at the Site by the HSC. Personnel may sign in and out on a log sheet as they enter and leave the CRZ, or the HSC may document entry and exit in a field notebook.

1.5 ENTRY REQUIREMENTS

In addition to the authorization, hazard briefing and certification requirements listed above, no person will be allowed to enter the Site unless he or she is wearing the minimum support zone PPE as described in Appendix I. Personnel entering the EZ or CRZ must wear the required PPE for those locations.

1.6 EMERGENCY ENTRY AND EXIT

People who must enter the Site on an emergency basis will be briefed of the hazards by the HSC. All hazardous activities will cease in the event of an emergency and any sources of emissions will be controlled, if possible.

People exiting the Site because of an emergency will gather in a safe area for a head count. The HSC is responsible for ensuring that all people who entered the work area have exited in the event of an emergency.

1.7 CONTAMINATION CONTROL ZONES

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

1.8 EXCLUSION ZONE (EZ)

The EZ consists of the specific work area, or may be the entire area of suspected contamination. All employees entering the EZ must use the required PPE, and must have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. The location of each EZ will be identified by cones, caution tape, or other appropriate means.

CONESTOGA-ROVERS & ASSOCIATES

1.9 CONTAMINATION REDUCTION ZONE (CRZ)

The CRZ or transition area will be established, if necessary, to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in a specific location. Personal protective outer garments and respiratory protection will be removed in the CRZ and either cleaned or disposed of. This zone is the only appropriate corridor between the EZ and the SZ.

1.10 SUPPORT ZONE (SZ)

The SZ is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the support area only after proper decontamination. Smoking only will be permitted in the SZ if the SZ is off Site, and subject to Site requirements.

APPENDIX C

ADDITIONAL EMPLOYEE TRAINING

CONESTOGA-ROVERS & ASSOCIATES

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1.0 ADDITIONAL EMPLOYEE TRAINING

1.1 GENERAL

Required project personnel must have completed hazardous waste operations-related training, as required by the OSHA Standard 29 CFR 1926.65. Field employees must also receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. The Site Superintendent must have completed an additional 8 hours of training for supervisors.

1.2 BASIC 40-HOUR COURSE

The following is a list of the topics typically covered in a 40-hour training course:

- general safety procedures;
- physical hazards (fall protection, noise, heat stress, cold stress);
- names and job descriptions of key personnel responsible for Site health and safety;
- safety, health, and other hazards typically present at hazardous waste sites;
- use, application, and limitations of PPE;
- work practices by which employees can minimize risks from hazards;
- safe use of engineering controls and equipment on site;
- medical surveillance requirements;
- recognition of symptoms and signs which might indicate overexposure to hazards;
- worker right-to-know (Hazard Communication OSHA 1926.59/1910.1200);
- routes of exposure to contaminants;
- engineering controls and safe work practices;
- components of a Site HASP;
- decontamination practices for personnel and equipment;
- confined space entry procedures; and
- general emergency response procedures.

1.3 SUPERVISOR COURSE

Management and supervisors receive an additional 8 hours of training which typically includes:

- general Site safety and health procedures;
- PPE programs; and
- air monitoring techniques.

1.4 SITE-SPECIFIC TRAINING

Site-specific training will be accomplished by each site worker reading this HASP, or through a Site briefing by the HSC on the contents of this HASP before work begins. The review must include a discussion of the radiological, chemical, and physical hazards, the protective equipment and safety procedures, and emergency procedures. Form 5.4 provides the Training Acknowledgment form.

1.5 DAILY SAFETY MEETINGS

Daily Safety Meetings will be held to cover the work to be accomplished, the hazards anticipated, the protective clothing and procedures required to minimize Site hazards and emergency procedures. These meetings should be presided by the Site Superintendent or HSC prior to beginning the day's field work. No work will be performed in an E2 before the daily safety meeting has been held. The daily safety meeting must also be held prior to new tasks, and reported if new hazards are encountered. Form 5.1 provides the Safety Meeting Report Form for documenting the daily safety meetings.

1.6 FIRST AID AND CPR

At least one employee current in first aid / CPR will be assigned to the work crew and will be on the Site during operations as defined in Section 5.4 of the HASP. Refresher training in first aid and CPR is required. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens.

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BASIC RADIATION SAFETY TRAINING

1.0 BASIC RADIATION SAFETY TRAINING

1.1 GENERAL

Personnel may be required to complete basic radiation safety training.

Basic Radiation Safety Training Course Outline:

Instructor	Date:
I. Introduction and Site History	
II. What is Radiation?	
III. Background Radiation	
IV. Types of Radiation	
a. Alpha	
b. Beta	
c. Gamma	
d. X-rays	
e. Neutrons	
V. Units of Radiation	
a. Activity (Ci, Bq)	
b. Exposure (R, rad, etc.)	
c. Common Sources of Radiation	
VI. ALARA Principles	
a. Time	
b. Distance	
c. Shielding	
VII. Biological Effects	
a. Nonstochastic (acute)	
b. Stochastic (chronic)	
c. Teratogens	
VIII. Exposure vs. Contamination (Fixed, Loose, and Airborne)	
IX. External and Internal Exposure to Radiation	
X. Dose Limits	
XI. Safe Work Habits	
a. Exclusion Zones, Postings, and Signs	
b. No Eating, Drinking, or Smoking	
c. Hygiene	
d. Dressing	
e. Dust control	
XII. Site Radiation Monitoring	
a. Gamma Surveys	
b. Removable Contamination	
c. Air Monitoring	
d. Personnel Film Badges	

BASIC HAZARDOUS SAFETY TRAINING ATTENDANCE SHEET

Title: Basic Radiation Safety Training
Date:
Instructor:
Format: Lecture

[illegible]

Instructor's Name (Printed): _____
Instructor's Signature: _____
Date: _____

APPENDIX 1.

REPRINTED FROM
KAPLAN, RICHARD. HEALTH HAZARD BOOK. REVISED EDITION
JANUARY 1970
U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
PAGES 194-203
PERSONNEL DECONTAMINATION

PERSONNEL DECONTAMINATION

Wet/dry	Surface	Action	Equipment	Advantages	Disadvantages
Soup and water	Skin and hands	Emulsifies and dissolves contaminants	Wash 2-3 minutes and massage with soap through you a third 3-5 times.	Proven available and effective for most radioactive contamination	Consistent washing will only get the skin. Decontamination of other than affected parts may spread contamination
Soup and water	Hair	Same as above	Wash several times. If contaminated is not allowed to escape length, shave the scalp and apply skin decontamination emulsions		
Leave soap, soft brush, and water	Skin and hands	Emulsifies dissolves and scrubs	Use light pressure with hair brush. Wash for 2-3 minutes. Rinse and massage. Use soap for 30 seconds or apply the skin. Apply emulsion or soap cream to prevent drying.	Same as above	Committed washing and scrubbing the skin

*Begin with the first listed method and then proceed step by step to the more secure methods, as necessary.

AREA AND MATERIAL DECONTAMINATION

Method/ Vacuum cleaning	Surface	Action	Technology	Advantages	Disadvantages
Vacuum cleaning	Dry surfaces	Removes contaminated dust by suction	Use conventional vacuum cleaners with efficient filter	Good on dry porous surfaces. Anticross water reactions	All dust must be filtered out of the vacuum. Anticross is controversial
Water	All nonporous surfaces (hard polished plastic etc.)	Disinfects and erodes	For large surfaces: Hose with a short pump at an ergonomic distance of 15 to 20 feet. Spray nozzle with an angle of inclination of 30° to 45°, work from top to bottom to avoid foam and to prevent contamination. Spray system to avoid spray. Determine cleaning time experimentally, if possible, otherwise use a rate of 4 square feet per minute.	All water equipment must be cleaned. Anticross must be discarded out from its disinfectant by 50% Water equipment may be used for solutions of other disinfecting agents	Cleaning must be continued for 10 minutes for porous materials. Other surfaces cannot be disinfected. No application on dry contaminated surfaces (use waterless disinfection on porous surfaces such as wood, concrete, canvas, etc.) Spray will be contaminated
Air	Surfaces	Disinfects and erodes	For small surfaces: Blid up liquid and material and use an appropriate commercial detergent	Extremely effective if done immediately after spill and on nonporous surfaces	Little value in the decontamination of large areas. Longstanding contaminants and porous material
Steam	Nonporous surfaces (hard polished or used surfaces)	Disinfects and erodes	View from top to bottom with a spray nozzle. Clean surface at a rate of 4 square feet per minute. The cleaning efficiency of steam has greatly increased by using synergistic agents	Contaminant may be reduced approximately 90% on painted surfaces	Steam should be same temperature as water. Steam hazard means the necessity of waterproof outfit near cleaning
Detergents	Nonporous surfaces (hard polished, glass, plastic etc.)	Emulsifies contaminants and increases efficiency of water and eroding efficiency of steam	Run at 1 to 1 1/2 mph with a spray nozzle with a 15° angle with dry soap. Use detergent solution for each application. Use a power spray nozzle with pressure head for more efficient cleaning. Apply solution from a distance with a pressure proportion. Do not fog solution. Do not spray other surfaces. Do not apply solution if it is not to be used.	Disinfects industrial site and other materials. Contaminant may be reduced by 80%.	May require personal contact with surface. May not be used on porous material. Contamination

*Begin with the first listed method and then proceed step by step to the more severe methods as necessary.

AREA AND MATERIAL DECONTAMINATION—Continued

Method	Surface	Action	Technique	Advantages	Disadvantages
Corrosive agents	Nonporous surfaces (concrete, masonry, etc.)	Formulate solution containing 3% by weight of agent. Spray surface with solution. Rinse surface with water. Repeat spray and rinse cycle. After 30 minutes, flush material off with water. Contaminated surfaces may be used on vertical and overhead surfaces by using material from caustic carbonate or aluminum hydroxide.	Complete agent solution should contain 3% by weight of agent. Spray surface with solution. Rinse surface with water. Repeat spray and rinse cycle. After 30 minutes, flush material off with water. Contaminated surfaces may be used on vertical and overhead surfaces by using material from caustic carbonate or aluminum hydroxide.	Requires application for 15 to 30 minutes. Little permeating power. If some residue on weathered surfaces.	
Organic solvents	Nonporous surfaces (concrete, masonry, etc.)	Dissolve porous deposits.	Use no-solvent procedure for removal. Acid should be kept at a concentration of 1 to 2 normal (1 to 10% hydrochloric, 3 to 5% sulfuric acid). Leave on weathered surfaces for 1 hour. Flush surface with water. Soak with a water detergent solution and rinse. Leave in place overnight. Rinse with plain water. A water detergent solution then again with plain water.	Quick dissolving action. Recovery of solvent possible by distillation.	Requires good ventilation and the precautions. Time to permeate. Material safety.
Inorganic acids	Nonporous surfaces (concrete, masonry, etc.)	Dissolve porous deposits.	Use no-solvent procedure for removal. Acid should be kept at a concentration of 1 to 2 normal (1 to 10% hydrochloric, 3 to 5% sulfuric acid). Leave on weathered surfaces for 1 hour. Flush surface with water. Soak with a water detergent solution and rinse. Leave in place overnight. Rinse with plain water. A water detergent solution then again with plain water.	Can be used on masonry and concrete. Good action may be achieved by action of caustic materials in solution.	Personal hazard. Water goggles, rubber boots, gloves, and apron. Good ventilation required because of fumes and explosive gases. Acid mingles acids not be mixed. Possibility of excessive corrosion if used without inhibitors. Sulfuric acid not effective on calcareous deposits.
Acid mixtures	Nonporous surfaces (concrete, masonry, etc.)	Dissolve porous deposits.	Same as for inorganic acids. A typical mixture consists of 0.1 gallon hydrochloric acid, 0.2 gallon sulfuric acid, and 1 gallon water.	Contamination may be reduced by 50% in 1 hour (unweathered surfaces). More easily handled than inorganic acid solution.	Weathered surfaces may require prolonged treatment. Same safety precautions as required for inorganic acids.

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

AREA AND MATERIAL DECONTAMINATION—Continued

Method	Surface	Action	Technique	Advantages	Disadvantages
Chlorine (hydrous, anhydrous, etc.)	Painted surfaces (horizontal)	Softens paint (into method)	Allow paint remover solution to remain on surface until paint is softened to the point where it may be scraped off with water. Remove remaining paint with long-handled scrapers. Typical paint remover solution: 10 gal. water, 4 lb. hyd. 6.0 gal. or compound (2.75 to 3.0 gal.)	Minimal contact with contaminated surface. Easily stored.	Personal hazard (will cause burns). Reaction slow. Not as efficient on vertical or overhead surfaces. Should not be used on aluminum or magnesium.
Trisodium phosphate	Painted surfaces (vertical, overhead)	Softens paint (into method)	Apply 10% solution by rolling and wiping procedure (see Decontam.)	Contamination may be reduced to tolerance in one or two applications.	Corrosive effect on paint. Should not be used on aluminum or magnesium.
Abrasion	Nonporous surfaces	Removes surface	Use conventional procedures, such as sanding, filing, or wet chipping. Keep surface damp to avoid dust hazard.	Contamination may be reduced to as a level as desired.	Irreparable for porous surfaces because of penetration by moisture.
Sandblasting	Nonporous surfaces	Removes surface	Use sand and water to blast surface. Keep surface damp to avoid dust hazard.	Practical for large surface areas.	Contamination spread over area must be removed. Contaminated dust is permeable hazard.
Vacuum blasting	Porous and non-porous surfaces	Removes surface. Also will control contaminated waste.	Hold foot 10 to 12 inches from surface. Use vacuum to collect waste. Keep surface damp to avoid dust hazard.	Contaminated waste ready for disposal. Same vacuum method.	Contamination of equipment.

*Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.

PROCESS WASTEWATER DEVICE INSPECTION FORM

Device 2 of 3

Date: 10/12/2006

Site Name: Highland Park Ford

Address: 1333 Park Avenue West

Highland Park, Illinois

Type of Device and System Location: Trench Drain System in Service Area

General Information:

Material of Construction: ☐ Concrete ☐ Steel/Cast Iron ☐ Concrete Block ☐ Brick ☐ Ceramic ☐ Plastic/PVC ☐ Other ☐ Unknown ☐ Cast Iron

Type of Construction: ☐ Monolithic ☐ Segments/Sections ☐ Pre-Constructed

Coating or Sealant: ☐ Asphaltic ☐ Rubber/Neoprene ☐ Epoxy ☐ None ☐ Steel/Cast Iron ☐ Plastic

Lid Type: ☐ Solid ☐ Grated

Age of Device: ☐ Actual 1985 ☐ Unknown (list age of the facility) _____

Dimensions: Opening (L x W): _____ feet x _____ feet or _____ feet diameter

Device (L x W x D): _____ feet long x 1 foot wide x _____ feet deep

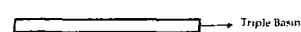
Inlet(s): 1. _____ 2. _____ 3. _____

Outlet: 1. _____ 2. _____ 3. _____

Inspection Comments (attach photographs to document construction and condition, if available. For suspected breaches here, job, depth, location and severity of each)

The trench drain is T-shaped and extends through the full length of the Service Area and Service Drive. There are ten drains associated with the trench drain system, spaced about 20 feet apart along the length of the system. Three of the ten drains were determined to be plugged within the discharge line somewhere between the drain and the triple basin; the other seven drains were clear. Overall, the trench drain system is in good condition, except for some minor deterioration of the concrete around the drains and for a small crack in the concrete base at a location six feet from the north end of the trench, in front of the car wash bay. The crack is part of a larger east-west crack in the Service Area concrete floor.

Device Sketch: (choose the appropriate device shape to sketch base)



Inspector: David H. Miller
Project: R. W. H. Inspection Form Use

111
Date Inspected: 10/12/06
Date Revised: 10/12/06

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APPENDIX

PERSONAL PROTECTIVE EQUIPMENT

1.0 PERSONAL PROTECTIVE EQUIPMENT

If anticipated chemicals are found on the site, the following PPE are required to safeguard Site personnel from various hazards. Varying levels of protection may be required depending on the level of contaminants and the degree of physical hazard. This section presents the various levels of protection and defines the conditions of use for each level.

1.1 LEVELS OF PROTECTION

Protection levels are determined based upon contaminants present in the work area. The specific protection levels to be employed at the Site are presented in Section 1.2.1 of this Appendix.

1.1.1 LEVEL D PROTECTION

The minimum level of protection that will be required for all Site personnel will be Level D. The following equipment will be used:

- work clothing as prescribed by the weather;
- steel toe work boots (except for liner installation personnel), meeting American National Standard Institute (ANSI) Z41;
- safety glasses or goggles, meeting ANSI Z87;
- cotton or leather work gloves;
- high visibility safety vest (as required);
- hard hat, meeting ANSI Z89; and
- hearing protection (if noise levels exceed 85 dBA, then hearing protection with a U.S. EPA NRR or at least 20 dBA must be used), as specified in Section 4.2.4 of the HASP.

1.1.2 MODIFIED LEVEL D PROTECTION

Modified Level D will be used when airborne contaminants are not present at levels of concern and site activities present an increased potential for skin contact with hazardous materials. Modified Level D consists of:

- i) Tyvek® coveralls;
- ii) safety toe work boots;
- iii) vinyl or latex boots, or polyvinyl chloride (PVC) overboots;
- iv) safety glasses or goggles;
- v) hard hat;
- vi) face shield in addition to safety glasses or goggles when projectiles and/or spinning liquids pose a hazard;
- vii) nitrile gloves;
- viii) hearing protection (if necessary); and
- ix) high visibility safety vest (as required).

1.1.3 LEVEL C PROTECTION

Level C protection will be worn when on site, real-time instrumentation indicates dusty conditions exceed levels described in the section below labeled "Dust / Particulate," as in the section labeled "Organic Vapors," or at the direction of the HSC.

The following equipment will be used for Level C protection:

- i) full-face or purifying respirator (APR) with organic vapor and gas cartridges in combination with particulate filters (P100) which are NIOSH approved;
- ii) polyethylene coated Tyvek® suit (if liquids/splashes hazards are present) or Tyvek® coveralls, ankles, and cuffs taped to boots and gloves;
- iii) nitrile gloves or nitrile sample gloves;
- iv) safety toe work boots, ANSI approved;
- v) chemical resistant neoprene boots with steel toes, or latex/PVC booties over safety toe shoes;
- vi) hard hat, ANSI approved;
- vii) hearing protection (if necessary); and
- viii) high visibility safety vest (as required).

1.1.4 LEVEL B PROTECTION

Level B protection will be worn when airborne concentrations of suspended contaminants are present at sustained levels greater than 25 ppm (if benzene is present) or if carbon monoxide levels exceed 25 ppm. The action level necessitating Level B protection may be revised subject to determination of the compounds triggering the Level B protection requirement.

The following equipment will be used for Level B protection:

- i) supplied air respirator (NIOSH approved). Respirators may be positive pressure-demand, self-contained breathing apparatus (SCBA), or positive pressure-demand airline respirator (with 5-minute escape bottle for immediately dangerous to life and health (IDLH) situations);
- ii) polyethylene coated Tyvek® or Saranex® coverall with ankles and cuffs taped to boots and gloves;
- iii) nitrile gloves or nitrile sample gloves;
- iv) safety toe work boots, ANSI approved;
- v) chemical resistant neoprene boots with steel toes, or latex/PVC booties over safety toe shoes;
- vi) hard hat, ANSI approved;
- vii) hearing protection (if necessary); and
- viii) high visibility safety vest (as required).

1.1.5 SELECTION OF PPE

Equipment for personal protection will be selected based on the potential for contact, site conditions, ambient air quality, and the judgement of supervising Site personnel and the HSC. The PPE used will be chosen to be effective against the compound(s) present on the site.

1.2 RESPIRATORY PROTECTION

Respiratory protection is an integral part of employee health and safety at sites with potential airborne contamination.

1.2.1 SITE RESPIRATORY PROTECTION PROGRAM

The Site respiratory protection program will consist of the following:

- i) all Site personnel who may use respiratory protection will have an assigned respirator;
- ii) all Site personnel who may use respiratory protection will have been fit tested and trained in the use of a full-facepiece APR within the past 12 months;
- iii) all Site personnel who may use respiratory protection must, within the past year, have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the HSC prior to commencement of Site work;
- iv) only cleaned, maintained, NIOSH approved respirators are to be used on this Site;
- v) if respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, prior to expected breakthrough or when filter load-up occurs;
- vi) contact lenses may be worn as described under section B.1.1, bullet 9 of this HASP;
- vii) all Site personnel who may use respiratory protection must be clean shaven where the respirator contacts the skin. Mustaches and sideburns are permitted at the discretion of the Site HSC. Permitted facial hair must not interfere with the sealing surface of the respirator;
- viii) respirators will be inspected and a negative pressure test performed prior to each use; and
- ix) after each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location in a manner that will not distort the facepiece.

It is anticipated that excavation activities will be conducted in Level D PPE, with provision to upgrade to Level C, based on action levels listed below.

Radioactive Substances, Dust / Particulate

The radioactive contamination on the Site is particulate and insoluble in water. Exposure to radioactive substances will be associated with exposure to airborne dust. A

personal aerosol monitor (e.g. MDP® Personal DataMon or equivalent) will also be utilized to determine airborne dust/particulate concentrations. A background reading will be established prior to commencing work activities at each active work area.

Action levels to determine the level of respiratory protection necessary for dust/particulate are based on the concentration of Site contaminants measured within the breathing zone. The action levels and appropriate respiratory protection are as follows:

<i>Sustained Reading Above Background Within Worker Breathing Zone in milligrams per cubic meter (mg/m³):</i>	<i>Action Taken</i>
< 5 mg/m³ or Background	Full-Face Respirator Available
> 5 mg/m³ and < 50 mg/m³	Wear Full-Face Respirator
> 50 mg/m³	Wear Supplied Air Respirator, Implement Additional Engineering Controls

Organic Vapors

A photoionization detector (PID) with a lamp of 10.2 eV or greater will be used to determine if organic vapors are present. A background reading will be established prior to commencing work activities at each active work area.

Action levels to determine the level of respiratory protection necessary for organic vapors are based on the concentration of Site contaminants measured within the breathing zone. The action levels and appropriate respiratory protection are as follows:

<i>Sustained Organic Vapor Reading Above Background Within Worker Breathing Zone (in Parts per Million (ppm) with Benzene present in the work zone:</i>	<i>Action Taken</i>
< 10 ppm or Background	Full-Face Respirator Available
> 10 ppm and < 25 ppm	Wear Full-Face Respirator
> 25 ppm	Wear Supplied Air Respirator, Implement Additional Engineering Controls

<i>Sustained Organic Vapor Reading Above Background Within Worker Breathing Zone (in Parts per Million (ppm) without Benzene present in the work zone:</i>	<i>Action Taken</i>
< 10 ppm or Background	Full-Face Respirator Available
> 10 ppm and < 250 ppm	Wear Full-Face Respirator
> 250 ppm	Wear Supplied Air Respirator, Implement Additional Engineering Controls

These action levels have been set based on the presence of BTEX as the main contaminants of concern. However, if the ambient concentrations of organic vapors are due to unidentified/unknown substances, the level of respiratory protection may be altered by the HSC.

1.3 USING PPE

Depending upon the level of protection selected for this project, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Level B or Level C PPE is used.

All personnel entering the EZ must put on the required PPE in accordance with the requirements of this plan. When leaving the EZ, PPE will be removed in accordance with the procedures listed, to minimize the spread of contamination.

1.3.1 DONNING PROCEDURES

These procedures are mandatory only if Level B or Level C PPE is used on the project:

- i) remove bulky outerwear. Remove street clothes and store in clean location;
- ii) put on work clothes or coveralls;
- iii) put on the required chemical protective coveralls or rain gear;
- iv) put on the required chemical protective boots or boot covers;
- v) tape the legs of the coveralls to the boots with duct tape;
- vi) put on the required chemical protective gloves;
- vii) tape the wrists of the protective coveralls to the gloves;
- viii) don the required respirator and perform appropriate fit check;

- viii) put hood or head covering over head and respirator straps and tape hood to facepiece; and
- ix) don remaining PPE, such as hard hat.

When these procedures are instituted, one person must remain outside the work area to ensure that each person entering has the proper protective equipment.

1.3.2 DOFFING PROCEDURES

The following procedures are only mandatory if Level B or C PPE is required for this project. Whenever a person leaves a Level B or C work-site, the following decontamination sequence will be followed:

- i) upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers;
- ii) clean reusable protective equipment;
- iii) remove protective garments, equipment, and respirator. All disposable clothing should be placed in a covered container which is labeled;
- iv) wash hands, face, and neck or shower (if necessary);
- v) proceed to clean area and dress in clean clothing; and
- vi) clean and disinfect respirator for next use.

All disposable equipment, garments, and PPE must be placed in covered containers and labeled for disposal. See Section B.0.1 for detailed information on decontamination procedures.

1.4 SELECTION MATRIX

The level of personal protection selected will be based upon real-time air monitoring of the work environment and an assessment by the Site Superintendent and HSC of the potential for skin contact with contaminated materials.

1.5 DURATION OF WORK TASKS

The duration of activities involving the usage of PPE will be established by the HSC based upon ambient temperature and weather conditions, the capacity of personnel to work in the designated level of PPE (heat stress, see Section 8.0 of the HASP) and limitations of the protective equipment (i.e., ensemble permeation rates, life expectancy of APF cartridges, etc.). As a minimum, rest breaks will be observed at the following intervals:

- 15 minutes midway between shift startup and lunch;
- 1/2 to 1 hour for lunch; and
- 15 minutes in the afternoon, between lunch and shift end.

All rest breaks will be taken in a clean area (e.g., 50') after full decontamination and PPE removal. Additional rest breaks will be observed, based upon the heat stress monitoring guidelines presented in Section 8.0 of the HASP.

1.6 LIMITATIONS OF PROTECTIVE CLOTHING

PPE ensembles have been selected to provide protection against contaminants at anticipated concentrations. However, no protective garment, glove, or boot is chemical-proof, nor will it afford protection against all chemical types. Permeation of a given chemical through PPE is a complex process governed by contaminant concentrations, environmental conditions, physical condition of the protection garment, and the resistance of a garment to a specific contaminant; chemical permeation may continue even after the source of contamination has been removed from the garment.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all Site personnel using PPE:

- when using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift;
- inspect all clothing, gloves, and boots both prior to and during use for:
 - imperfections;
 - non-uniform coatings;
 - tears; and
 - poorly functioning closures; and

- inspect reusable garments, boots, and gloves both prior to and during use for:
 - visible signs of chemical permeation;
 - swelling;
 - softening;
 - discoloration;
 - stiffness;
 - brittleness;
 - cracks;
 - any sign of puncture; and
 - any sign of abrasion.

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above will be discarded. PPE used in areas known or suspected to exhibit elevated concentrations of contaminants will not be reused.

APPENDIX C

PERSONNEL EXPOSURE AND AIR MONITORING PROGRAM

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1.0 PERSONNEL EXPOSURE AND AIR MONITORING PROGRAM

This section of the HASP presents the requirements for conducting personnel exposure and air monitoring at the Site. The program is designed to ensure protection for both personnel working on Site and the surrounding community. The on-site monitoring program will be conducted by the remedial contractor and will consist of monitoring Site personnel exposures to radiation, VOCs, and dust/particulate. In addition, monitoring will be conducted for oxygen and combustible gas levels. This monitoring will be completed with the use of both real-time reading instruments and dosimeter testing techniques.

A Community Air Monitoring Program (CAMP) will be implemented and maintained by the RSSI and will consist of real-time Site air monitoring around the Site perimeter.

1.1 ON-SITE AIR MONITORING

In addition to the radiologic concerns discussed in RSSI's Radiological HASP (Appendix M), the HSC or Environmental Monitoring Technician will perform air monitoring to evaluate the exposure of Site personnel to chemical and physical hazards, verify the effectiveness of engineering controls, and determine the proper level of PPE. During the progress of excavation activities, the HSC will monitor the levels of VOCs, oxygen and combustible gases, and particulate levels on an hourly basis or more frequently as necessary. The following monitoring equipment will be used for this purpose:

- a PID equipped with at least 10.2 eV lamp;
- a four gas meter capable of measuring oxygen levels / combustible gas / carbon monoxide / hydrogen sulfide;
- a multigas personal alarm meter (e.g., MSA Passport Five Star Personal Alarm or equivalent);
- personal aerosol monitor (e.g., MIEG Personal DataRam or equivalent); and
- colorimetric tubes for detection of benzene (as required).

All instruments will be calibrated on a daily basis in accordance with the manufacturer's guidelines. Records of all calibrations and real-time measurements will be kept in a bound field log book.

1.1.1 REAL-TIME VOC MONITORING

The HSC will continuously monitor for the presence of VOCs. PID readings will be taken in and around all E2s. Action levels for upgrading or downgrading of PPE have been established by the USEPA for atmospheres containing unknown concentrations of VOCs. Table 9.1 presents the action levels for the on-Site Air Monitoring Program.

1.1.2 COMBUSTIBLE GAS, OXYGEN, HYDROGEN SULFIDE, CARBON MONOXIDE

Air monitoring for combustible gases and oxygen will be conducted during excavation, activities, and during other activities where oxygen deficient and/or flammable atmospheres may be encountered (e.g., confined spaces; entry into excavations). The point of excavation and the immediate work area around these activities must be monitored to ensure that an adequate level of oxygen is present, and to determine if a flammable atmosphere exists. Combustible gas and oxygen level monitoring will be conducted as needed in areas that are suspect. The HSC will determine the monitoring frequency based on the observed site conditions. All work activity must stop where monitoring indicates the flammable vapors concentration is 10 percent of the lower explosive limit (LEL) at a level with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level.

In addition to combustible gas and oxygen, monitoring for hydrogen sulfide and carbon monoxide will be conducted during all confined space entry activities, including excavation entry.

Action levels for combustible gases, oxygen, hydrogen sulfide and carbon monoxide are presented in Table 9.1.

1.1.3 PERSONAL AIR MONITORING

HSC or designee will also implement a personnel air monitoring program for those employees who have the highest risk of potential for exposure to chemicals present on Site. This monitoring will be done in compliance with 1926.65(a) and in accordance with OSHA's standards for lead (1926.62) and benzene (1926.1126). HSC or designee may select additional chemical compounds to be monitored based upon Site VOC measurements and site conditions throughout the project. Samples will be collected during startup of the excavation activities, where personnel would face potential

exposure, for the purpose of verifying the adequacy of personal protection and to document the actual exposure level to the selected chemical compound. The number and frequency of sampling events will be determined by the HSC. Appropriate NIOSH methodology will be followed and all samples are to be sent to an American Industrial Hygiene Association (AIHA) accredited laboratory. Results for all personnel air sampling will be posted for all project personnel to review.

1.2 COMMUNITY AIR MONITORING PROGRAM (CAM)P

Air monitoring will be conducted during performance of the remedial activities to ensure that the community will not be adversely impacted during Site activities. The CAM will be implemented and maintained by RSSI. Site personnel should contact the RSSI directly for more detailed information about the CAM.

1.3 DECONTAMINATION PROCEDURES

In general, anything that enters the EZ at this Site must either be decontaminated or properly discarded upon exit from the EZ. All personnel, including any State and local officials must enter and exit the EZ through the CRZ. Prior to demobilization, potentially contaminated equipment will be decontaminated on a wash pad (decontamination pad) which has a built in sump and the equipment will be inspected by the HSC before it is moved into the clean zone. Any material that is generated by decontamination procedures will be stored in a designated area in the EZ until disposal arrangements are made.

The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for heavy equipment and for any reusable PPE is Liquid-mox soap. The Material Safety Data Sheets (MSDS) for Liquid-mox and any other chemical containing products brought to the Site will be maintained on Site by the HSC.

1.4 EQUIPMENT DECONTAMINATION PROCEDURES

All equipment that comes in contact with waste material must be decontaminated within the CRZ by a pressure water cleaner upon exit from the EZ. Decontamination procedures should include: knocking soil/mud from machines; water brush scrubbing using a solution of water and Liquid-mox; and a final water rinse. Personnel shall wear Level C or Modified Level D protection, as determined by the HSC, when

decontaminating equipment. Runoff and sediments will be collected and stored until proper disposal arrangements have been made. Following decontamination and prior to exit from the EZ, the HSC shall be responsible for ensuring that the item has been sufficiently decontaminated. This inspection shall be included in the Site log.

1.5 PERSONNEL DECONTAMINATION PROCEDURES

Personnel decontamination will be completed in accordance with the personnel decontamination procedures detailed in Appendix 1. The general guidelines for a typical Level C decontamination line are described below.

- upon entering the CRZ, rinse contaminated materials from boots or remove contaminated boot covers;
- clean reusable protective equipment;
- remove protective garments, equipment, and respirator. All disposable clothing should be placed in a covered container which is labeled;
- wash hands, face, and neck or shower (if necessary);
- proceed to clean area and dress in clean clothing and
- clean and disinfect respirator for next use

1.6 MEDICAL SURVEILLANCE

In accordance with the requirements detailed in 29 CFR 1926.65 and 29 CFR 1910.134, all Site personnel who will come in contact with potentially contaminated materials will have received, within one year prior to starting field activities, medical surveillance by a licensed physician or physician's group. If it is documented that personnel at the Site are exposed to levels of lead above its action level of 30 µg/m³, then personnel who work in the EZ will require additional medical surveillance in accordance with 29 CFR 1926.62(j). This medical monitoring will include blood sampling and analysis for lead and zinc protoporphyrin as required in OSHA's lead standard, 29 CFR 1926.62.

Medical records for all on-Site personnel will be maintained by their respective employers. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work.

The following hand signals will be used by downrange field teams in conjunction with the "Buddy" system. These signals are very important when working with heavy equipment. They shall be known by the entire field team before operations commence:

Signal	Meaning
• Hand Clipping Throat	Out of Air/Can't Breathe
• Grip Partner's Wrist	Leave Area Immediately
• Hands on Top of Head	Need Assistance
• Thumb's Up	OK, I'm All Right, I Understand
• Thumbs Down	No, Negative

1.8 EMERGENCY AND FIRST AID EQUIPMENT

Emergency safety equipment will be available for use by Site personnel and will be located and maintained on Site. The safety equipment will include, but not be limited to, the following:

- portable emergency eye wash and drench shower (personnel);
- two 25-pound ABC type dry chemical fire extinguishers;
- approved first-aid kit for a minimum of twenty personnel;
- fire blanket;
- two SCBA units; and
- portable air horn.

1.9 PROJECT PERSONNEL RESPONSIBILITIES DURING EMERGENCIES

1.9.1 HEALTH AND SAFETY COORDINATOR (HSC)

As the administrator of the HASP, the HSC has primary responsibility for responding to and correcting emergency situations. The HSC will:

- take appropriate measures to protect personnel including: posting of acceptable Site evacuation routes, withdrawal from the EZ total evacuation and securing of the Site or upgrading or downgrading the level of protective clothing and respiratory protection;

- take appropriate measures to protect the public and the environment including: notifying and securing the Site, preventing runoff to surface waters, and sealing or controlling the emergency to the extent possible;
- ensure that appropriate federal, state, and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted;
- ensure that appropriate decontamination treatment or testing for exposed or injured personnel is obtained;
- determine the cause of the accident and make recommendations to prevent the recurrence; and
- ensure that all required reports have been prepared.

1.10 MEDICAL EMERGENCIES

Any person who becomes ill or injured in the EZ must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed as much as possible without causing further harm to the patient. First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the HSC, Site Superintendent, and Resident Engineer.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a copy of the identified chemicals on Site to which they may have been exposed.

Any vehicle used to transport contaminated personnel, will be cleaned or decontaminated as necessary.

1.11 FIRE OR EXPLOSION

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the HSC or designated downrange will advise the fire commander of the location, nature, and identification of the hazardous materials on Site.

The medical records will be available to the employee or his designated representative upon written request, as outlined in 29 CFR 1910.1020.

Each employee will provide certifications to their on-Site HSC that their personnel involved in Site activities will have all necessary medical examinations prior to commencing work which requires respiratory protection or potential exposure to hazardous materials. Personnel not obtaining medical certification will not perform work within contaminated areas.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to any Site activity or when an accidental exposure to elevated concentration of contaminants occurs.

1.7 EMERGENCY CONTINGENCIES

It is essential that Site personnel be prepared in the event of an emergency. Emergencies can take many forms: illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate. Radios will be provided for contact purposes. All emergencies will be reported to the appropriate emergency responders. They may give the selected contractor and/or the subcontractor further direction as to the responsibilities during any emergency situation. In general, selected contractor and subcontractor personnel will shut down equipment and evacuate to a safe predetermined meeting area during Site emergencies.

Communication between work areas and the command post, located within the CZ, will be via verbal communication, auto horn, or two-way radio. The HSC will use the nearest telephone on Site or may be in the possession of a mobile telephone to communicate with outside emergency and medical facilities.

The following signals shall be established for use with auto or compressed air-type horns:

- 3 Blasts: evacuate exclusion area through Gate(s) and muster at designated muster points determined by the HSC.
- An "All Clear" will be conveyed by radio communication.

If it is safe to do so, Site personnel should:

- report to the Resident Engineer;
- use fire fighting equipment available on Site, or
- remove or isolate flammable or other hazardous materials which may contribute to the fire

1.12 SPILL OF HAZARDOUS MATERIALS

On Site:

If a spill occurs, the following procedure will be followed:

- notify the HSC, Site Superintendent, and Resident Engineer;
- evacuate immediate area of spill;
- determine the needed level of PPE;
- don required level of PPE and prepare to make entry to apply spill containment and control procedures;
- no entry will be made until atmosphere is less than 20 percent of the LFL, and
- absorb or otherwise clean up the spill and containize the material, sorbent, and affected soils

The Site Superintendent has the authority to commit resources as needed to contain and control released material and to prevent its spread to off-Site areas.

Releases from drums containing solid wastes will be placed into approved containers and covered. Each container will be labeled as to its contents. Solid spills from haulage units will be placed back into haulage units.

In the event that a drum or container of liquid is spilled on Site outside of the EZ, a drum handling team will immediately respond to the spill. The spilled liquids will be confined in the immediate area of the spill and the liquids will be pumped, with the use of a portable hand pump, into a repack drum. The spilled liquids will be confined by diking around the spill with native material or with an inert absorbent. Any residual liquids which cannot be pumped will be absorbed with a sufficient quantity of inert

absorbent to ensure that no free liquids remain. If the spill occurred on soil, the visibly affected soil will be excavated to limits based on a visual determination of spill contamination with the concurrence of the on-Site Client Representative. The absorbent and excavated material will be drummed or otherwise appropriately contained.

2.0 RECORD KEEPING

The HSC shall establish and maintain records of all necessary and prudent monitoring activities as described below:

- i) name and job classification of the employees involved on specific tasks;
- ii) records of fit testing and medical surveillance results for Site personnel;
- iii) records of all OSHA training/certification for Site personnel;
- iv) records of training acknowledgment forms and daily safety meetings;
- v) emergency report sheets describing any incidents or accidents; and
- vi) air / radiological monitoring equipment calibrations.

APPENDIX H

ACTIVITY HAZARD/RISK ANALYSIS AND GENERAL SAFETY PRACTICES

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1.0 ACTIVITY HAZARD/RISK ANALYSIS AND GENERAL SAFETY PRACTICES

This section identifies the general hazards associated with specific remedial activities and presents the documented or potential health and safety hazards that exist at the Site. Every effort will be made to reduce or eliminate these hazards. Those which cannot be eliminated must be guarded against by use of engineering controls and/or PPE.

In addition to the radiological and chemical hazards presented in this HASP, physical hazards including hazards presented by the use of heavy equipment, overhead and underground utility hazards, uneven terrain, slippery surfaces, and the use of decontamination equipment, exist at the Site. It will be the responsibility of the HSC and Site personnel to identify the physical hazards posed by the various Site remedial activities and implement preventative and corrective action.

Potential for heat and cold stress and confined spaces and excavations are previously discussed in Sections 4.2.1, 4.2.2, and 13.0 of this HASP.

1.1 CHEMICAL EXPOSURE

Chemical substances can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systemically, causing a toxic effect at a part of the body distant from the point of initial contact. The chemical contaminants of concern at the Site are outlined in Table 2.1.

Chemical exposures are generally divided into two categories: acute and chronic. Symptoms resulting from acute exposures usually occur during or shortly after exposure to a sufficiently high concentration of a contaminant. The concentration required to produce such effects varies widely from chemical to chemical. The term "chronic exposure" generally refers to exposure to "low" concentrations of a contaminant over a long period of time. The "low" concentrations required to produce symptoms of chronic exposure depend upon the chemical, the duration of each exposure, and the number of exposures. For a given contaminant, the symptoms of an acute exposure may be completely different from those resulting from chronic exposure.

For either chronic or acute exposure, the toxic effect may be temporary and reversible, or may be permanent (disability or death). Some chemicals may cause obvious symptoms such as burning, coughing, nausea, tearing eyes, or rashes. Other chemicals may cause health damage without any such warning signs (this is a particular concern for chronic

exposures to low concentrations). Health effects such as cancer or respiratory disease may not become evident for several years or decades after exposure. In addition, some toxic chemicals may be colorless and/or odorless, may dull the sense of smell, or may not produce any immediate or obvious physiological sensations. Thus, a worker's senses or feelings cannot be relied upon in all cases to warn of potential toxic exposure.

The effects of exposure not only depend on the chemical, its concentration, route of entry, and duration of exposure, but may also be influenced by personal factors such as the individual's smoking habits, alcohol consumption, medication use, nutrition, age, and sex.

An important exposure route of concern at the Site is inhalation. The lungs are extremely vulnerable to chemical agents. Even substances that do not directly affect the lungs may pass through lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body. Some toxic chemicals present in the atmosphere may not be detected by human senses (i.e., they may be colorless, odorless, and their toxic effects may not produce any immediate symptoms). Respiratory protection is therefore extremely important if there is a possibility that the work-site atmosphere may contain such hazardous substances. Chemicals can also enter the respiratory tract through punctured condoms. Where this is a hazard, individuals with punctured condoms should be medically evaluated specifically to determine if such a condition would place them at an unacceptable risk and provide their working at the task in question.

Direct contact of the skin and eyes by hazardous substances is another important route of exposure. Some chemicals directly injure the skin. Some pass through the skin into the bloodstream where they are transported to vulnerable organs. Skin absorption is enhanced by abrasions, cuts, heat, and moisture. The eye is particularly vulnerable because airborne chemicals, once dissolved in its moist surface and be carried to the rest of the body through the bloodstream (capillaries are very close to the surface of the eye). Wearing protective equipment, not using contact lenses in contaminated atmospheres (since they may trap chemicals against the eye surface), keeping hands away from the face, and minimizing contact with liquid and solid chemicals can help protect against skin and eye contact.

Although ingestion should be the least significant route of exposure at the site, it is important to be aware of how this type of exposure can occur. Deliberate ingestion of chemicals is unlikely; however, personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics at the site may provide a route of entry for chemicals.

The last primary route of chemical exposure is injection, whereby chemicals are introduced into the body through puncture wounds (i.e., by stepping or tripping and

falling onto contaminated sharp objects). Wearing safety shoes, avoiding physical hazards, and taking common sense precautions are important protective measures against injection.

1.2 GENERAL PRACTICES

Additional general safety practices to be implemented are as follows:

- at least one copy of this HASP must be at the project Site, in a location readily available to all personnel, and reviewed by all project personnel prior to starting work;
- all Site personnel must use the buddy system (working in pairs or teams);
- food, beverages, or tobacco products must not be present or consumed in the EZ and CRZ. Cosmetics must not be applied within these zones;
- emergency equipment such as eyewash, fire extinguishers, etc., must be removed from storage areas and staged in readily accessible locations;
- contaminated waste, debris, and clothing must be properly contained and legible and understandable precautionary labels must be affixed to the containers;
- removing contaminated soil from protective clothing or equipment with compressed air, shaking, or any other means that disperses contaminants into the air is prohibited;
- containers must be moved only with the proper equipment, and must be secured to prevent dropping or loss of control during transport; and
- visitors to the Site must be instructed to stay outside the EZ and CRZ and remain within the SZ during the extent of their stay. Visitors must be cautioned to avoid skin contact with surfaces that are contaminated or suspected to be contaminated.

1.2.1 BUDDY SYSTEM

All on-Site personnel must use the buddy system. Visual contact must be maintained between crew members at all times, and crew members must observe each other for signs of hazardous chemical exposure, heat, or cold stress. Indications of adverse effects include, but are not limited to:

- changes in complexion and skin coloration;
- changes in coordination;

- excessive salivation and pupillary response; and
- changes in speech pattern.

Team members must also be aware of potential exposure to possible safety hazards, unsafe acts, or non-compliance with safety procedures. Employees must inform their partners or fellow team members of non-visible effects of exposure to hazardous materials. The symptoms of such exposure may include:

- headaches;
- dizziness;
- nausea;
- blurred vision;
- cramps; and
- irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

1.3 HEAT STRESS

Refer to Section 4.2.1 in the HASP.

1.4 COLD STRESS

Refer to Section 4.2.2 in the HASP.

1.5 EXCAVATION

Site activities will involve extensive excavation of soil / fill material. The Remedial Contractor will be responsible for developing and implementing procedures related to excavation and handling of these materials.

Excavation and trenching operations require pre-planning to determine whether sloping or shoring systems are required, and to develop appropriate designs for such systems.

Also, the estimated location of all underground installations must be determined before digging begins.

If there are any nearby buildings, walls, sidewalks, trees, or roads that may be threatened or undermined by the excavation, where the stability of any of these items may be endangered by the excavation, they must be removed or supported by adequate shoring, bracing, or underpinning.

Excavations may not go below the base of footings, foundations, or retaining walls, unless they are adequately supported or a person who is registered as a Professional Engineer (PE) has determined that they will not be affected by the soil removal. OSHA recommends that civil engineers or those with licenses in a related discipline and experience in the design and use of sloping and shoring systems be engaged. PE qualifications must be documented in writing.

Personnel required to enter or work in the excavation at any time must be protected from the hazards of cave-ins. This requires the use of sloping and/or shoring systems that comply with State and Federal (OSHA) standards.

Attachment A - Excavation and Trenching will be followed during all excavation activities and provides detailed information regarding such activities.

1.6 CONFINED SPACES

Refer to Section 4.3 of the HASP.

1.7 FALL HAZARDS

Site personnel may be exposed to fall hazards greater than six feet above another surface and where there are no barriers in place to protect them. These hazards may be found in the following activities: working from elevated surfaces, near excavations, or on equipment, etc.

It is the responsibility of the HSC to implement the following components of the Site Fall Protection Program.

- Ensure appropriate fall protection systems are utilized for project activities;
- Verify that all employees are fully protected from fall hazards.

- Necessary materials for proper fall protection (PPH, etc.) are available for project activities;
- Provide for proper inspection and replacement of fall protection devices; and
- Provide and ensure that all personnel have received the required training in the use, inspection and the need for fall protection devices (proper fit, proper use, and proper inspection procedures).

1.8 BIOLOGICAL HAZARDS

There are no known or suspected biological hazards at the Site. If any are identified during the progress of the work then amendments to the HASP will be made.

1.9 NOISE

General requirements regarding noise exposure at the Site are covered under Section 4.2.4 of the HASP.

1.10 SANITATION

Site sanitation will be maintained according to OSHA and Department of Health requirements.

1.10.1 BREAK AREA

Breaks must be taken in the SZ, away from the active work area after Site personnel go through decontamination procedures. There will be no smoking, eating, drinking, or chewing gum or tobacco in the area other than the SZ.

1.10.2 POTABLE WATER

Refer to Section 11.1 of the HASP.

1.10.3 SANITARY FACILITIES

Access to facilities for washing before eating, drinking, or smoking will be provided. Showers facilities will also be provided at the Site (if necessary).

1.10.4 LAVATORY

If permanent toilet facilities are not available, an adequate number of portable chemical toilets will be provided.

1.10.5 TRASH COLLECTION

Trash collected from the CRZ will be separated as potentially contaminated waste. Trash collected in the support and break areas will be disposed of as non-hazardous waste. Trash receptacles will be set up in the CRZ and in the SZ.

1.11 ELECTRICAL HAZARDS

Refer to Section 14.1 of the HASP.

1.12 LIFTING HAZARDS

Back strain or injury may be prevented by using proper lifting techniques. The fundamentals of proper lifting include:

- consider the size, shape, and weight of the object to be lifted. A mechanical lifting device or additional persons must be used to lift an object if it cannot be lifted safely alone;
- the hands and the object should be free of dirt or grease that could prevent a firm grip;
- gloves must be used, and the object inspected for metal shavings, jagged edges, burrs, or rough or slippery surfaces;
- fingers must be kept away from points which could crush or pinch them, especially when putting an object down;

- feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear;
- the load should be kept as low as possible, close to the body with the knees bent;
- to lift the load, grip firmly and lift with the legs, keeping the back as straight as possible;
- a worker should not carry a load that he or she cannot see around or over; and
- when putting an object down, the stance and position are identical to that for lifting; the legs are bent at the knees, and the back is straight as the object is lowered.

APPENDIX I
PERSONNEL DECONTAMINATION PROCEDURES

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2.0 DECONTAMINATION METHODS

Decontamination methods shall involve physically removing contaminants, neutralizing contaminants, or removing contaminants through a combination of both physical and chemical means. The types, locations, physical states, and concentrations of contamination present will determine the appropriate method of decontamination.

2.1 PROCEDURES

This Standard Operating Procedure (SOP) contains personnel decontamination procedures for Levels A, B, C, and D. The site Health and Safety Officer is responsible to monitor those procedures, and may modify them to suit the site conditions and specific levels in use. General standard operating procedures to be followed are:

- minimize contact with contaminants in order to minimize the need for extensive decontamination;
- gloves, boot covers, and disposable outer clothing shall be rolled down with the inside out.
- sampling/monitoring equipment, when feasible, shall be enclosed in plastic bags to prevent cross-contamination and
- decontamination solutions of soap and water or trisodium phosphate (TSP) detergent and water shall be used as a minimum requirement

2.2 EQUIPMENT DECONTAMINATION

Monitoring equipment will be decontaminated before leaving the site by wiping with a damp cloth or by removing and properly disposing of a protective covering. Construction equipment will typically be manually scraped then steam cleaned. The HSO is responsible to verify that this has been done satisfactorily.

3.0 WASTE DISPOSAL

CRA project management will determine a disposal method based on an approval plan for each specific site.

3.1 MANAGEMENT AND DISPOSAL OF DECONTAMINATION SOLUTIONS

Decontamination solutions must be treated or properly disposed of. In determining if a particular management disposal option is appropriate, the following should be considered:

- the contaminants, their concentrations, and the total volume of decontamination solution;
- media potentially affected (e.g., groundwater, soil) under management options;
- location of the nearest population(s) and the likelihood and/or degree of site access;
- potential exposure to workers and
- potential for environmental impacts.

All wastes belong to clients and are to be left on site. CRA will notify the client what has been left on site and offer to help in arranging proper disposal/treatment.

DECONTAMINATION

1.0 DECONTAMINATION

1.1 SCOPE

Personal protective equipment (PPE) and monitoring equipment must either be decontaminated or properly discarded upon exiting from the exclusion zone. This practice prevents cross-contamination to clean areas. All site personnel must enter and exit the exclusion zone through the contaminant reduction zone and decontamination area. The configuration of these zones will vary from site to site and will be defined in the site-specific HASP.

4.0 SHOWERS AND CHANGE ROOMS

Showers and/or change rooms may be provided for site personnel when the duration of project activities extends for a long period of time or will be provided when site conditions warrant the need for a separate change area. Showering requirements vary from site to site and are defined in the site-specific HASP based on site-specific conditions.

5.0 DECONTAMINATION LEVELS

LEVEL A - ROUTINE DECONTAMINATION

Step 1 - Segregated Equipment Drop

- Deposit equipment used on site (tools, sampling devices, monitoring equipment, radios, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination.

Step 2 - Boot Cover and Glove Wash

- Scrub outer boot covers and gloves with decontamination solution or detergent/water.

Step 3 - Boot Cover and Glove Rinse

- Rinse off decontamination solution from Step 2 using copious amounts of water.
- Repeat as many times as necessary.

Step 4 - Tape Removal

- Remove tape around boots and gloves and deposit in container with plastic liner.

Step 5 - Boot Cover Removal

- Remove boot covers and deposit in container with plastic liner.

Step 6 - Outer Glove Removal

- Remove outer gloves and deposit in container with plastic liner.

Step 7 - Suit/Safety Boot Wash

- Thoroughly wash fully encapsulating suit and boots. Scrub suit and boots with long-handle, soft-bristle scrub brush, and copious amounts of decontamination solution or detergent/water. Repeat as many times as necessary.

Step 8 - Suit/Safety Boot Rinse

- Rinse off decontamination solution or detergent/water using copious amounts of water. Repeat as many times as necessary.

Step 9 - Tank Change

- If worker leaves the exclusion zone to change air tank, this is the last step on the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers donned, and joints taped. Worker then returns to duty.

Step 10 - Safety Boot Removal

- Remove safety boots and deposit in container with plastic liner.

Step 11 - Fully Encapsulating Suit and Hard Hat Removal

- With assistance of helper, remove fully encapsulating suit (and hard hat). Hang suits on rack or lay out on drop cloths.

Step 12 - SCBA Backpack Removal

- While still wearing facemask, remove backpack and place on table. Disconnect hose from regulator valve and proceed to next step.

Step 13 - Inner Glove Wash

- Wash with decontamination solution or detergent/water that will not harm skin. Repeat as many times as necessary.

Step 14 - Inner Glove Rinse

- Rinse with water. Repeat as many times as necessary.

Step 15 - Facemask Removal

- Remove facemask. Deposit in container with plastic liner. Avoid touching face with fingers.

Step 16 - Inner Glove Removal

- Remove inner gloves and deposit in container with plastic liner.

Step 17 - Inner Clothing Removal

- Remove clothing soaked with perspiration. Place in container with plastic liner. Inner clothing should be removed as soon as possible since there is a possibility that small amounts of contaminants might have been transferred in removing fully encapsulating suit.

Step 18 - Field Wash

- Shower if highly toxic, skin corrosive, or skin absorbable materials are known or suspected to be present. Wash hands and face if shower is not available.

Step 19 - Beddown

- Put on clean clothes. A dressing trailer is needed in inclement weather.

5.2 LEVEL B - ROUTINE DECONTAMINATION

Step 1 - Equipment Drop

- Deposit equipment used on site (tools, sampling devices, monitoring equipment, radios, etc.) on plastic drop cloths.
- Decontaminate or dispose of items before removal from the exclusion zone.

Step 2 - Outer Boot/Glove Wash and Rinse

- Scrub outer boots/gloves with decontamination solution.
- Rinse using water.

Step 3 - Outer Boot/Glove Removal

- Remove outer boots/gloves.
- If outer boots/gloves are disposable, deposit in container with plastic liner.
- If outer boots/gloves are non-disposable, store in a clean, dry location.

Step 4 - Outer Garment Removal

- If using self-contained breathing apparatus (SCBA), remove SCBA backpack and keep the facemask on until garments are removed. Remove chemical protective outer garments and deposit in appropriate container.

Step 5 - Respiratory Protection Removal

- Remove hard hat and facemask, and place them on a clean surface.
- Wash and rinse face piece.
- Wipe off and store face piece in a clean, dry location.

Step 6 - Inner Glove Removal

- Remove inner gloves.
- Deposit in container for disposal.

Step 7 - Field Wash

- Thoroughly wash hands and face with soap and water.
- Shower as soon as possible.

For Air Tank Exchange Only, Complete the Following Steps:

Step 1 - Equipment Drop

- Deposit equipment used on site (tools, sampling devices, monitoring equipment, radios, etc.) on plastic drop cloths.
- Decontaminate or dispose of items before removal from the exclusion zone.

Step 2 - Glove Removal

- Remove gloves.
- If gloves are disposable, deposit in container with plastic liner.
- If gloves are non-disposable, store in a clean, dry location.

Step 3 - Tank Change

- Exchange air tank.
- Don new gloves.
- Tape joints and return to the exclusion zone.

5.3 LEVEL C - ROUTINE DECONTAMINATION

Step 1 - Equipment Drop

- Deposit equipment used on site (tools, sampling devices, monitoring equipment, radios, etc.) on plastic drop cloths.
- Decontaminate or dispose of items before removal from the exclusion zone.

Step 2 - Outer Boot/Glove Wash and Rinse

- Scrub outer boots/gloves and/or splash suit with decontamination solution.
- Rinse using water.

Step 3 - Outer Boot/Glove Removal

- Remove outer boots/gloves.
- If outer boots/gloves are disposable, deposit in container with plastic liner.
- If outer boots/gloves are non-disposable, store in a clean, dry place.

Step 4 - Outer Garment Removal

- Remove chemical protective outer garments and deposit in appropriate container.

Step 5 - Respiratory Protection Removal

- Remove hard hat and respirator and deposit on a clean surface.
- Discard respiratory cartridges in appropriate container.
- Wash and rinse respirator.
- Wipe off and store respirator in a clean, dry location.

Step 6 - Inner Glove Removal

- Remove inner gloves.
- Deposit in container for disposal.

Step 7 - Field Wash

- Thoroughly wash hands and face with soap and water.
- Shower as soon as possible.

For Cartridge Exchange Only, Complete the Following Steps:

Step 1 - Equipment Drop

- Deposit equipment used on site (tools, sampling devices, monitoring equipment, radios, etc.) on plastic drop cloths.
- Decontaminate or dispose of items before removal from the exclusion zone.

Step 2 - Glove Wash and Rinse

- Scrub gloves and/or splash suit with decontamination solution.
- Rinse using water.

Step 3 - Glove Removal

- Remove gloves.
- If gloves are disposable, deposit in container with plastic liner.
- If gloves are non-disposable, store in a clean, dry place.

Step 4 - Respiratory Cartridge Change

- Exchange respiratory cartridges.
- Don new outer boots/gloves.
- Tape joints and return to the exclusion zone.

5.4 LEVEL D: MODIFIED ROUTINE DECONTAMINATION

Step 1: Equipment Decon

- Deposit equipment used on site (tools, sampling devices, monitoring equipment, radios, etc.) in plastic drop cloths.
- Decontaminate or dispose of items before removal from the exclusion zone.

Step 2: Outer Boots/Gloves/Wash and Rinse

(Optional, include if necessary for gross decontamination)

- Scrub outer boots/gloves and/or splash suit with decontamination solution.
- Rinse using water.

Step 3: Outer Boots/Gloves Removal

- Remove outer boots/gloves.
- If outer boots/gloves are disposable, deposit in container with plastic liner.
- If outer boots/gloves are non-disposable, store in a clean, dry place.

Step 4: Outer Garments Removal

- Remove chemical protective outer garments and deposit in an appropriate container.
- Remove hard hat and safety glasses. Decontaminate as necessary. Deposit on a clean surface.

Step 5: Inner Glove Removal

- Remove inner gloves.
- Deposit in a container for disposal.

Step 6: Final Wash

- Thoroughly wash hands and face with soap and water.
- Shower as soon as possible.

APPENDIX I

TRENCHING

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TRENCHING/EXCAVATION

1.0 INTRODUCTION

This procedure provides the minimum requirements for safe work practices during excavation and trenching operations. This procedure is intended to ensure compliance with the Occupational Safety and Health Act (OSHA) standards for these activities (29 CFR 1926, Subpart P).

This procedure applies to all excavation and trenching operations conducted by CRA. The selected contractor must develop their own Standard Operating Procedure (SOP) which adheres to this SOP and is in compliance with the OSHA regulations.

1.1 DEFINITIONS

The following definitions apply specifically to excavation and trenching operations.

Competent Person:	A worker who is trained and capable of identifying existing and predictable hazards at excavations. Such workers must have the authority to shut down operations if new hazards are identified.
Registered Professional Engineer:	A person who is registered as a Professional Engineer (PE) in the state where the work is to be performed. OSHA recommends using civil engineers or those with licenses in a related discipline and experience in the design and use of shoring and shoring systems. PE qualifications must be documented in writing.
Excavation:	Any man-made cut, cavity, trench, or depression in an earth surface, formed by dirt or rock removal. This includes landfills and piping trenches and openings caused by underground storage tank removal.
Cave-In:	Soil or rock falling into an excavation from the sides; soil or rock falling out from under a trench or support system.

Cave-ins are usually sudden movements that can trap, bury, or crush workers in the excavation.

Benching:	A method of protecting workers from cave-ins by excavating the sides of an excavation to form a series of horizontal levels or steps.
Shoring:	Wooden, metal, or hydraulic bracing systems that support the sides of an excavation to prevent cave-ins.
Sloping:	Flattening the sides of an excavation at an angle to maintain stability and prevent cave-ins. Sloping angles are stated as the horizontal distance back from the foot of the slope, versus the vertical height of the slope. For example, 1.5 feet horizontal to 1 foot vertical (1.5:1). Slopes may also be stated as the number of degrees in the angle formed by the slope. A 1.5:1 slope is also a 34° angle. The larger the angle, the steeper the slope. A vertical wall is a 90° angle.

2.0 RESPONSIBILITIES

2.1 RESPONSIBILITIES OF THE PROJECT MANAGER (PM)

It is the PM's responsibility to communicate to the Site Supervisor that project activities will need to comply with the OSHA standards for excavation activities.

2.2 RESPONSIBILITIES OF THE PC AND/OR SITE SUPERVISOR

It is the responsibility of the Site Supervisor to implement the following components of the Excavation and Trenching Activities SOP as they relate to project activities.

- that all excavations are completed in accordance with this SOP;
- that the proper protective materials and equipment are available to complete the excavation and/or trenching procedures;
- complete all inspections of the excavation as required; and
- submit any Subcontractor's Excavation and Trenching SOP to the HSC for review prior to initiating excavation activities.

3.0 REQUIREMENTS

3.1 PRE-PLANNING

Excavation and trenching operations require pre-planning to determine whether sloping or shoring systems are required, and to develop appropriate designs for such systems.

3.2 BURIED UTILITIES

The estimated location of all underground installations must be determined before digging begins. The local Underground Facilities Protective Organization (UFPPO) or utility companies must be contacted and requested to locate such underground public utilities at least 2 business days prior to the start of work. Property owners and facility operators must also be contacted prior to project startup to locate underground private utilities and installations. Ground-penetrating radar or other equipment may be useful in locating such utilities.

When excavations approach the estimated location of the underground utilities, cautious locations must be determined by hand shoveling, poking wood or brass rods into the ground, or some other means of safely identifying and uncovering them.

All underground installations must be protected, supported, or removed in order to prevent injuries and damage during excavation. Where utilities or underground installations will be removed, they must be drained, flushed, de-energized, and locked out and tagged prior to removal.

3.3 ABOVEGROUND STRUCTURE AND LANDSCAPING

If there are any nearby buildings, walls, sidewalks, trees, or roads that may be threatened or undermined by the excavation, where the stability of any of these items may be endangered by the excavation, they must be removed or supported by adequate shoring, bracing, or underpinning.

Excavations may not go below the base of footings, foundations, or retaining walls, unless they are adequately supported or a PE has determined that they will not be affected by the soil removal (see definition of PE above).

3.4 PERSONNEL ENTRY INTO EXCAVATIONS

Personnel required to enter or work in the excavation at any time must be protected from the hazards of cave-ins. This requires the use of sloping and/or shoring systems that comply with State and Federal OSHA standards.

3.5 MAXIMUM EXCAVATION DEPTHS

Excavations less than 5 feet deep do not require sloping or shoring. If a "competent person" examines the ground and finds no indication of a potential cave-in (see the definition of "competent person" above).

Excavations greater than 5 feet deep must be sloped or shored to protect personnel working inside.

Excavations deeper than 20 feet must be subjected to soil classification, regardless of whether workers enter the hole or not. Sloping and/or shoring systems for such excavations must be approved by a PE who is licensed in the State where the work will take place.

3.6 PERSONNEL ENTRANCE AND EXIT LADDERS/RAMP

Where personnel must enter excavations greater than 4 feet deep, ladders or stairs must be provided so that workers are not required to travel more than 25 feet to reach an exit.

3.7 VEHICLE TRAFFIC

Personnel exposed to vehicle traffic must wear high-visibility warning vests. Measures must be put in place to route traffic away from or safely around excavations. This includes placing traffic barriers, traffic cones, and high-visibility warning signs.

Vehicle traffic and heavy equipment can create vibration that may make the excavation unstable. Where such hazards exist, sloping and shoring systems must be designed to withstand these vibrations.

3.8 OXYGEN DEFICIENCY AND HAZARDOUS ATMOSPHERES

All excavations greater than 4 feet deep will be monitored for oxygen deficiency and any hazardous atmospheres (such as methane, hydrogen sulfide, or volatile organic compounds) if there is any risk of these accumulating in the excavation. If a hazardous atmosphere is present, ventilation or other control systems must be used to remove the hazard. In addition, where ventilation is used, air monitoring must be repeated every 15 minutes to verify that the excavation remains safe for workers to enter.

Emergency rescue equipment and a safety standby person must be present at the excavation whenever hazardous atmospheres exist or could reasonably develop.

3.9 WATER TABLE DEPTHS AND WATER ACCUMULATION IN EXCAVATIONS

The height of the local water table must be determined if there is any possibility of water entering or accumulating in the excavation and if there is any possibility of rain or snowfall or running during excavation operations.

If rain or snow falls or water enters the excavation between work shifts, the excavation must be thoroughly inspected and certified safe by the "competent person" on site before anyone re-enters the hole.

Personnel are not permitted to work in excavations where water is accumulating or has accumulated UNLESS the water is continuously pumped out and the sloping or shoring system has been designed to withstand exposure to water without cave-ins. Personnel working in such wet conditions will also wear safety harnesses and rescue lines attached to a stable tie-off point at the top of the excavation that is capable of withstanding 5,000 pounds of force for each attached worker.

3.10 SPOILS PILES, EQUIPMENT, AND TOOL STORAGE

Small equipment, tool storage, shoring supplies, and spoils piles must be placed at least 2 feet away from the top edge of the excavation. In addition, heavy equipment and vehicles must be positioned at least 2 feet from the top edge of the excavation.

3.11 EQUIPMENT OPERATOR VISIBILITY DURING EXCAVATION ACTIVITIES

Assess whether heavy equipment operators will be able to clearly see the excavation edge while working. When equipment operators do not have a clear and direct view of the edge, barricades, stop logs, or hand signals must be used to warn them of their positions.

3.12 PERSONNEL WORKING ON EXCAVATION FACE

If personnel will be working on the excavation face at more than one level, they must be protected from falling rock or soil that may be generated by others working at levels above them. Protective barricades will be necessary at intervals along the face to provide this protection. The excavation face may also be scraped to remove loose materials.

Personnel are prohibited from working, standing, or traveling below loads being lifted or moved. Such loads include the buckets of excavators, backhoes, and loaders. Drivers of vehicles that are being loaded must remain in the vehicles during loading.

3.13 PERSONNEL AND EQUIPMENT CROSSOVER POINTS

Where personnel or equipment will be required to cross over the excavation, walkways, or bridges with standard 42-inch high guardrails, midrails, and pinch high toeboards must be provided across the excavation. These bridges must be strong enough to withstand the weight of people, objects, and vehicles traveling across them.

4.0 SOIL TYPES

OSHA classifies soils into one of three types: A, B, or C. OSHA sloping and shoring requirements are based on the types of soil present at each work site.

Note that the definitions of these soil types are specific to compliance with OSHA excavation and trenching regulations. These definitions do not necessarily match terms used in geology or engineering soil studies.

4.1 TYPE A SOILS

Type A soils are defined as cohesive. They stick together easily and resist breaking apart under pressure. Clay, silty clay, sandy clay, and clay loam are examples of cohesive soils.

Type A soils must have an unconfined compressive strength greater than or equal to 1.5 tons per square foot.

Soil cannot be classified as Type A if it is fissured, subject to vibration, or if it has been previously disturbed or backfilled.

4.2 TYPE B SOILS

Type B soils include cohesive soil that has an unconfined compressive strength between 0.5 and 1.5 tons per square foot. Soil that has an unconfined compressive strength greater than 1.5 tons per square foot and is fissured or subject to vibration is also classified as Type B.

Some other soils that are granular and exhibit poor cohesion may be included as Type B materials. Angular gravel (similar to crushed rock), silt, silty loam, and sandy loam are examples of these materials.

4.3 TYPE C SOILS

Type C soils include cohesive soil that has an unconfined compressive strength less than 0.5 tons per square foot. Loose granular soils such as gravel, sand, and loamy sand are also classified as Type C.

5.0 OSHA SOIL CLASSIFICATION PROCEDURES

Soil classification must be done in accordance with methods described in the OSHA excavation standard. Visual examination will be followed by at least one manual test until the material is classified as Type A, B, or C.

A large chunk of soil, about the size of a backhoe bucket, should be used to make the classification. Samples must be collected in an undisturbed area before excavation begins.

It may be necessary to examine multiple samples to address the possibility of layering or multiple soil types in the proposed excavation or trench. If layers are present, each layer must be classified separately.

5.1 VISUAL EXAMINATION

Is the material entirely solid rock without cracks or fissures?

YES: Type A. Verify this by testing the unconfined compressive strength as described in Section 6.2, below.

Is the material submerged under water, saturated with water, or seeping water?

YES: Type C

Does the excavated soil remain in clumps?

NO: Type C

YES: Perform manual testing as described in Section 6.2, below.

5.2 MANUAL TESTING

Test the material for its unconfined compressive strength by one or both of the following methods.

Method A:

Can a thumb be pressed into the soil several inches with very little effort?

YES: Type C. Compressive strength is less than 0.5 tons per square foot (tsf).

NO: Is the material fissured, cracked, or subject to vibration?

YES: Type C

NO: Type A or B

If the material is fissured, cracked, subject to vibration, previously disturbed, or backfilled, it drops a level in the hierarchy of stability.

Method B (most accurate):

Press a pocket penetrometer into a ball of soil.

Less than 0.5 tsf, Type C

Between 0.5 and 1.5 tsf, Type B

Greater than 1.5 tsf, Type A

If the material is fissured, cracked, subject to vibration, previously disturbed, or backfilled, it drops a level in the hierarchy of stability.

To confirm the decision to classify soil as Type B or C, perform a plasticity test. Roll a lump of soil into a rope that is no more than 1/8 inch thick and is at least 2 inches long. Does the rope break when it is lifted into the air by one end?

YES: Type C

NO: Type B

5.3 DOCUMENTATION

Soil classifications must be documented in writing. This may be done as part of the site's daily operating logs. Documentation must include, as a minimum:

- date and time of sample collection and testing;
- location of soil sample collection;
- physical condition and description of sample and any layering observed;
- methods used for classifying soil types;
- results of soil classification; and
- name of the "competent person" who performed the soil classification.

6.0 LAYERED SOILS

In situations where different soil layers are present, each layer must be classified separately as Type A, B, or C. Where unstable soil is present underneath a stable soil layer, the shoring or shoring system for the entire excavation must meet the requirements for the most unstable soil. For example: If Type C soil is present under a layer of Type B, the entire excavation or trench must use the shoring or shoring requirements for Type C soil.

If Type B soil is present under Type C, the lower layer may be shored or shored to meet Type B requirements and the upper layer to meet Type C.

7.0 SELECTION AND DESIGN OF SLOPING SYSTEMS

Sloping systems must be selected to meet the requirements of Appendix B of the OSHA excavation standard 29 CFR 1926 Subpart F. This appendix provides detailed diagrams and specifications for the allowable angle of sloped excavations and trenches based on the types of soil present.

Sloping designs for excavations greater than 20 feet deep must be prepared by a PE. OSHA allows four options for sloping excavations less than 20 feet deep:

7.1 ONE AND ONE-HALF TO ONE SLOPING

Excavations may be sloped to a 34° angle or flatter without classifying the soil types or consulting a PE. This angle is equal to cutting the excavation back 1.5 feet horizontally for every 1 foot of depth.

This option may be impractical if the excavation is very deep or if the area around the excavation is restricted. Using the flattest slope, without classifying soil types, may result in removing substantially more soil than necessary. For example, a 10-foot deep hole would require removal of at least 2,250 cubic feet using 1.5:1 slope. If the soil is classified as Type B, with an allowable slope of 1:1, less than half as much soil (about 1,000 cubic feet) must be removed. This can provide significant savings in man-hours and disposal costs for contaminated soils.

7.2 STEEPER SLOPES

If soils are classified as Type A, B, or C, in accordance with the OSHA standard, steeper sloping angles may be possible. In excavations less than 20 feet deep, Type A soils may be sloped at 0.5 foot horizontal to 1 foot vertical and Type B soils at 1 foot horizontal to 1 foot vertical. Type C soils must still use the 1.5 foot horizontal to 1 foot vertical slope.

7.3 ALTERNATIVE SLOPING DESIGNS BY PEs

If soils are classified as Type A, B, or C, an alternative sloping system may be designed by a PE, based on other tabulated data or previous work experience. Where an alternative sloping system is used, at least one written copy of the design must be kept

at the job site while the slope is being constructed. This copy must include the data or other information used to develop the design, a description of the soil classification procedure and results, the specified measurements for sloping, and the name of the PE who developed and approved the design.

7.4 BENCHING

Benching is a method of protecting personnel from cave-ins by cutting a series of horizontal levels or steps in the sides of an excavation. Benching may only be used when soils have been classified as Type A or B according to the OSHA excavation standard. The benching design must meet the requirements of Appendix B of the standard. Any alternative benching systems must be approved by a PE with the same written documentation as described in Section 5.3.

8.0 SELECTION AND DESIGN OF SHORING SYSTEMS

Shoring systems must be selected to meet the requirements of Appendix C or D of the OSHA excavation standard 29 CFR 1926, Subpart P. This appendix provides detailed specifications for the strength, physical size, and number of timbers or other structural materials used to build shoring systems.

Shoring systems for excavations greater than 20 feet deep must be designed by a PE. OSHA allows similar options to those described for sloping, when selecting shoring for excavations less than 20 feet deep.

8.1 WOOD AND ALUMINUM SHORING SPECIFICATIONS

If soils are classified as Type A, B, or C in accordance with the standard, a wood or aluminum shoring system may be selected from Appendices C or D of the OSHA excavation standard 29 CFR 1926, Subpart P.

Note that lumber used to construct shoring must be new, previously unused, and free of knots or cracks.

The size of wooden timbers listed in Appendix C of 29 CFR 1926, Subpart P, is the actual size of the lumber, NOT the nominal size that is usually quoted when pre-cut timbers are sold. Timbers used for shoring systems must usually be special ordered from a lumber yard or sawmill in the exact sizes listed in Appendix C of the OSHA excavation standard.

8.2 PRE-MANUFACTURED SHORING SYSTEMS

After classifying the soil types, OSHA also allows the employer to use pre-manufactured shoring systems. This involves using the manufacturer's specifications to determine which shoring system will be used. The manufacturer must approve any design changes in writing before there is any deviation from their original recommendations.

A written copy of the manufacturer's specifications and any approved changes, must be kept at the job site while the shoring is constructed.

8.3 ALTERNATIVE SHORING SYSTEMS DESIGNED BY A PE

If soils are classified as Type A, B, or C, an alternative shoring system may be designed by a PE, based on any other tabulated data or previous work experience.

Where an alternative shoring system is used, at least one written copy of the design must be kept at the job site while the shoring is being constructed.

This copy must include the data or other information used to develop the design, a description of the soil classification procedure and results, the specified measurements for shoring, and the name of the PE who developed and approved the design.

8.4 SHORING INSTALLATION AND REMOVAL

Shoring systems must be installed from the top down as excavation or trenching progresses. Removal must take place from the bottom up, with the hole being backfilled as the shoring is removed.

Workers may not enter the excavation until adequate shoring is in place to prevent a cave-in. Workers will not remain in the excavation during removal of shoring unless an alternate means of support is provided to prevent cave-ins.

9.0 TRENCH SHIELDS

Trench shields are structures designed to prevent workers from being injured in a cave-in. These devices are reinforced metal boxes that are placed inside trenches using a crane. The boxes may be stacked or placed side by side in order to fill the depth and width of a trench.

The top of the trench shield must extend at least 18 inches above the top of the excavation.

Workers are to remain within the trench shield at all times in the excavation. Trench shields will not prevent cave-ins. They do not support the walls of the trench. They only protect workers inside the box if the trench caves in. An arm or leg outside the trench shield may be torn off or crushed by falling soil if a cave-in occurs.

All personnel will leave the excavation or trench while the trench shield is moved or repositioned.

Stacked trench shields must be bolted together and ladders must be provided for workers to enter and exit the boxes. The ladders must be placed inside the trench shield and must extend at least 3 feet above the top of the shield. Workers must have no more than 25 feet of travel to reach one of the ladders in an emergency.

10.0 COMPETENT PERSON INSPECTIONS

When personnel enter excavations, the excavations must be inspected at the start of each work shift by a "competent person" (see the definition of "competent person" above).

Inspections must include checking for any evidence of damage, defects, or loose parts in the shoring system. Personnel may not enter the excavation until any such problems have been corrected.

Inspections must also include looking for any evidence of possible cave-ins, hazardous atmospheres, water accumulation, undermining, or material breaking off the sides of the excavation. Any changes or new hazards must be addressed before workers enter the excavation.

Inspections must be repeated after rain or snowfall, after freezing or thawing, and after any other hazard-increasing occurrence.

When a new hazard is identified while workers are in the excavation, all exposed personnel must be evacuated from the excavation until the situation is corrected.

Daily inspections will be documented in writing in the site's daily operating logs.

11.0 BARRICADES AND WARNING SIGNS

Unattended excavations, and those in remote areas, require barricades or covers with warning signs to prevent persons and equipment from falling into them. Large excavations may require temporary fencing to prevent unauthorized access. Barriers with flashing warning lights will be used when excavations are left open after dark.

APPENDIX K
ELECTRICAL SAFETY

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ELECTRICAL SAFETY

1.0 INTRODUCTION

The objective of the Electrical Safety Standard Operating Procedure (SOP) is to provide electrical safety guidelines, procedures, and inspections for the purpose of ensuring the safety of all Site personnel. Additionally, adherence to this SOP ensures compliance with the Occupational Safety and Health Administration (OSHA) requirements.

2.0 SCOPE

The scope of this SOP applies to all Conestoga-Rovers & Associates (CRA) personnel and subcontractors involved with field or construction activities utilizing electrical power. Electrical inspections are to occur during initial Site setup and monthly thereafter. These inspections are to be documented via either the Superintendent's logbook, the Site Health and Safety Officer's (HSO) logbook, or on the attached forms. The frequency of the inspections are to occur initially and then on a monthly basis thereafter. These forms can provide guidance for conducting the inspection as well as documenting them.

3.0 RESPONSIBILITIES

3.1 SUPERINTENDENTS/EQUIPMENT MANAGERS

It is the responsibility of the Site Superintendent (SS) and/or the Equipment Manager (EM) to assign a "competent person" to inspect and test electrical equipment. Additionally, the SS and/or EM are to ensure that the Assured Equipment Grounding Conductor Program (See Section 4.0) is implemented on Site.

3.2 COMPETENT PERSON

The competent person has the responsibility to inspect and test on-Site electrical equipment and tools, including faulty insulation, improper grounding, loose electrical connections, and defective parts. The competent person will conduct testing and inspections upon initial project setup and monthly thereafter.

APPENDIX L

RESPIRATORY PROTECTION PROGRAM

3.3 EMPLOYEES

Employers and subcontractors have the responsibility to follow the Project Safety Program and the constituents of this SOP. This includes the daily visual inspection of cord sets, electrical tools, or other pieces of electrical equipment before use.

4.0 ASSURED EQUIPMENT GROUNDING CONDUCTOR PROGRAM

4.1 GENERAL

As per OSHA, correct ground-fault protection requires the use of either Ground Fault Circuit Interrupters (GFCIs), which are devices that prevent electrical shock or an Assured Equipment Grounding Conductor Program. An Assured Equipment Grounding Conductor Program is a program that covers the inspection, repair and/or maintenance of cords and receptacles that are not part of the permanent wiring of a building, and equipment connected by cord and plug not protected by a GFCI.

4.2 APPROVED TESTING PROCEDURES

These following testing procedures are required by law before first use, after any repairs, after any suspected damage may have occurred, and at quarterly intervals. Any equipment in need of repair shall be taken out of service until repairs have been made.

4.2.1 TESTING FOR CONTINUITY

The continuity test is used to assure that the equipment grounding conductor is electrically continuous. It must be performed on all cords and receptacles that are not part of the permanent wiring. This testing can be accomplished with a continuity tester.

4.2.2 VISUAL TESTING

Receptacles and attachment caps or plugs are visually inspected to ensure that the equipment grounding is attached to its proper terminal.

4.3 INSPECTION DOCUMENTATION PROCEDURES

The required equipment inspections, tests, and testing date will be recorded, and the record is to be kept in the on-Site project file or in the Site Superintendent's or HSO's logbook. Electrical equipment used on Site will be inspected for damage or defects before each days use, and any equipment that is found to be defective will be taken out of service immediately.

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2.0 RESPONSIBILITIES

2.1 INDUSTRIAL HYGIENE AND SAFETY GROUP

The Industrial Hygiene and Safety Group (IHSG) is collectively responsible for establishing and maintaining this respiratory protection program consistent with the goal of protecting CRA personnel. IHSG will oversee this respiratory protection program which is designed and organized to ensure respirators are properly selected, used, and maintained by CRA personnel, and to meet federal regulatory standards (29 CFR 1910.134) and industry accepted standards (ANSI).

IHSG is also responsible for evaluating those tasks for which respiratory protection is thought to be necessary, determine the degree of hazard posed by the potential exposure, determine whether engineering or administrative controls are feasible, and will specify which respiratory protection device is to be used at each task. In addition, IHSG will train personnel in the selection and use of respiratory protective devices, conduct qualitative and quantitative fit testing, and issue necessary protective devices.

2.2 OCCUPATIONAL HEALTH CLINICS

The CRA Contracted Occupational Health Clinics are charged with establishing medical evaluation and surveillance procedures and reviewing the health status of all personnel who may be required to wear respiratory protective equipment in the completion of their assigned tasks.

2.3 SUPERVISORS/PROJECT MANAGERS

Supervisors and Project Managers will ensure each employee under his or her supervision wearing a respirator has received appropriate training in its use and an annual medical evaluation. Supervisors will ensure the availability and use of appropriate respirators and accessories, provide adequate storage facilities, and encourage proper respiratory equipment maintenance. Supervisors must be aware of tasks requiring the use of respiratory protection, and ensure all employees engaged in such work use the appropriate respirators at all times.

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2.4 RESPIRATOR WEARERS

It is the responsibility of each respirator wearer to wear his/her respirator when and where required and in the manner in which he/she was trained. Respirator wearers must report any medical issues related to respirator use, or malfunctions of the respirator to his/her supervisor, the site safety officer, or the IHSG immediately. The respirator wearer must also guard against mechanical damage to the respirator, clean and maintain the respirator as instructed, and store the respirator in a clean, sanitary location.

2.5 OTHERS

Personnel, such as clients, inspectors, and visitors, who must enter an area where the use of respiratory protective equipment is required, shall have and use appropriate equipment, and have been instructed by their respective companies in respirator use and limitations. Visitors shall have been fit tested and proven medically qualified by their company to wear the respirator prior to entry to a site. CRA shall obtain proof of such training and medical requirements from the visitor's company. If a Site Health and Safety Plan (HASPP) exists, in accordance with that plan, the visitor must be briefed on site-specific hazards.

Contractors are required to develop and implement a respiratory protection program for their employees who must enter into or work in areas where exposure to hazardous materials cannot be controlled or avoided. This program must meet OSHA regulations and include issuance of respirators, medical evaluations, fit testing, and training. A copy of a contractor's respiratory protection program should be part of their HANP.

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RESPIRATORY PROTECTION

1.0 INTRODUCTION

It is the policy of Conestoga-Rovers & Associates (hereby referred to as CRA) personnel to provide employees with a safe and healthful working environment. This is accomplished by utilizing facilities and equipment that have all feasible safeguards incorporated into their design. When effective engineering controls are not feasible, such as on a hazardous waste or construction sites or when they are being initiated, protection shall be used to ensure personnel protection.

1.1 SCOPE

This program applies to all employees who are required to wear respirators during normal work operations. This includes all active field staff and some laboratory personnel. Currently, this program does not specifically address the voluntary use of respirators, as any utilization of respiratory devices is considered sanctioned under this current program.

This program does not apply to contractors, subcontractors, or subcontractors, as they are responsible for providing their own respiratory protection programs, respiratory protective equipment, training, and fit testing.

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3.0 MEDICAL SURVEILLANCE

CRA has strategically contracted with medical providers located near all of its offices to provide Occupational Medical coverage for its staff. The Occupational Physician or Occupational Health Clinic, initially, and periodically thereafter, makes a determination as to whether or not an employee can wear a respirator without physical or psychological risk. Based on the overall health of the individual and special medical tests (pulmonary function studies, FEV₁, etc.) as appropriate, the examining physician determines whether the individual will be restricted from wearing respiratory protective equipment. If a medical restriction is applied, the employee and the IHSG are formally notified of the restriction. The IHSG will communicate to the employee's supervisor. Specific medical tests and procedures will be determined by the Occupational Health Physician and will be in accordance with current OSHA medical surveillance requirements and/or NIOSH recommendations.

The medical evaluation will be repeated annually for persons wearing respirators for more than 30 days per year, other more casual users will be evaluated biennially. Any employee refusing the medical evaluation will not be allowed to work in areas requiring respirator use or on any site where respirator use may be necessary as a contingency.

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4.0 SELECTION AND USE OF RESPIRATORY PROTECTIVE DEVICES

4.1 RESPIRATOR USE

Respiratory protection is authorized and issued for the following personnel:

- Employees in areas known to have contaminant levels requiring the use of respiratory protection or in which contaminant levels requiring the use of respiratory protection may be reached without warning (e.g., emergency purposes such as hazardous material spill responses, plant maintenance, and confined space entry).
- Employees performing operations documented to be health hazards and those unavoidably required to be in the immediate vicinity where similar levels of contaminants are generated (e.g., hazardous waste site overnight or construction).
- Employees in suspect areas or performing operations suspected of being health hazards but for which adequate sampling data has not been obtained (e.g., laboratory and research functions, treatment plant maintenance, and some construction).

4.2 RESPIRATOR SELECTION

Selection of the proper respirator(s) to be used in any work area or operation is made only after a determination has been made as to the real and/or potential exposure of employees to harmful concentrations of contaminants in the workplace atmosphere. This evaluation will be performed prior to the start of any routine or non-routine tasks requiring respirators and is usually identified in the HASP. Respiratory protective devices will be selected by the IHSC, using ANSI Z89.2, CRIHA Rules, NIOSH Certified Equipment List, and/or the NIOSH Respirator Selection Decision Logic as a guide. The following items will be considered in the selection of respirators:

- Effectiveness of the device against the substance of concern
- Estimated maximum concentration of the substance in the work area
- General environment (open area or confined space, etc.)
- Known limitations of the respiratory protective device
- Comfort, fit, and worker acceptance and
- Other contaminants in the environment or potential for oxygen deficiency

Supervisors and project managers shall consult IHSC prior to non-routine work which may expose workers to hazardous substances or oxygen deficient atmospheres. Examples of work which may require the use of respirators include, but are not limited to:

- Abrasive blasting;
- Cutting or melting lead or stripping lead-based paints from surfaces;
- Treatment plant operation and maintenance (O&M) activities;
- Welding or burning;
- Painting, especially with epoxy or organic solvent coatings;
- Using solvents, thinners, or degreasers;
- Any work which generates large amounts of dust;
- Working in a confined space;
- Hazardous waste site work; and
- Exposure to bioaerosols.

A review of the real and/or potential exposures is made periodically to determine if respiratory protection continues to be required, and to verify that the previously chosen respirators still provide adequate protection. The frequency of this assessment is based on the duration of the field activity, or for stationary activities (e.g., laboratory work) will not exceed 1 year.

4.2.1 SERVICE LIFE OF AIR-PURIFYING CARTRIDGES AND CANISTERS

The canisters or cartridges of air-purifying respirators are intended to be used until filter resistance precludes further use, or the chemical sorbent is expended as signified by a specific warning property (e.g., odor, taste, etc.). Under recent regulation, waiting for breakthrough to change cartridges is an unacceptable practice. Because CRA does not work with specific identifiable chemicals, the site-specific HASP will specify when cartridges must be changed. If not mentioned in the HASP, at a minimum, cartridges or filters shall always be replaced when a respirator is released and shall be **changed at least on a daily basis regardless of saturation condition**. When in doubt about the previous use of the respirator, obtain a replacement canister or cartridge.

The following is a partial list of factors that may affect the usable cartridge service life and/or the degree of respiratory protection attainable under actual workplace conditions. These factors should be considered when developing a cartridge change-out schedule in a HASP.

- Type of contaminant(s).
- Contaminant concentration.
- Relative humidity.
- Breathing rate (workload).
- Temperature.
- Changes in contaminant concentration, humidity, breathing rate, and temperature.
- Mixture of contaminants: (1) multiple contaminants present simultaneously versus (2) alternate usage of the same cartridges against different contaminants in different scenarios.
- Accuracy in the determination of the conditions.
- The contaminant concentration in the workplace can vary greatly. Consideration must be given to the quality of the estimate of the workplace concentration.
- Cartridge storage conditions (exposure to trace levels of contaminants and humidity and elevated temperatures).
- Storage conditions between multiple uses of the same respirator cartridges. It is recommended that the chemical cartridges be replaced after each work shift. Contaminants adsorbed on a cartridge (especially low boiling point materials, BP <50°C), can migrate through the carbon bed without airflow. Desorption of the contaminant (including those with poor sorbing properties) after partial use of the chemical cartridge can occur after a short period (hours) without use (e.g., overnight) and result in a non-use exposure to someone nearby (e.g., in an office trailer).
- Age of the cartridge.
- Condition of the cartridge and respirator.
- Respirator and cartridge selection
- Respirator fit.
- Respirator assembly, operation, and maintenance.
- User training, experience, and medical fitness.
- Warning properties of the contaminant.

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- The quality of the warning properties should be considered when establishing the chemical cartridge change schedule. Good warning properties may provide a secondary or backup indication for cartridge change-out. Change schedules for contaminants with poor warning properties may require a greater safety factor than a contaminant with good warning properties.
- Other conditions specific to the particular user and/or workplace.

Ultimately, the cartridge manufacturer has to be consulted to calculate/predict cartridge change-out procedures based on the chemicals of concern and the variable factors listed above. This potentially will differ with each brand of respirator used at CRA.

4.3 TYPES OF RESPIRATORS

When respirators are used, the predominant type employed by CRA is the air-purifying device. Infrequently, CRA utilizes air-supplied respirators. These devices are used when USEPA Level B is specified in a HASP.

4.3.1 AIR-PURIFYING RESPIRATOR

These respirators remove air contaminants by filtering, absorbing, adsorbing, or chemical reaction with the contaminants as they pass through the respiratory canister or cartridge. This respirator is to be used only where adequate oxygen (19.5 to 23.5 percent by volume) is available. Air-purifying respirators can be classified as follows:

- Particulate removing respirators, which filter out dusts, fumes, fumes, and mists. These respirators may be single-use disposable respirators or respirators with replaceable filters.
- Gas- and vapor-removing respirators, which remove specific individual contaminants or a combination of contaminants by absorption, adsorption or by chemical reaction. Gas masks and chemical-cartridge respirators are examples of gas- and vapor-removing respirators.
- Combination particulate/gas- and vapor-removing respirators, which combine the respirator characteristics of both kinds of air-purifying respirators.

4.3.2 SUPPLIED-AIR RESPIRATORS

These respirators provide breathing air independent of the environment. Such respirators are to be used when the contaminant has no distinct odor, taste, or irritating warning properties, or when the contaminant is of such high concentration or toxicity that an air-purifying respirator is inadequate. Supplied-air respirators, also called air-line respirators, are classified as follows:

- Demand: This respirator supplies air to the user on demand (inhalation) which creates a negative pressure within the facepiece. Leakage into the facepiece may occur if there is a poor seal between the respirator and the user's face. CRA does not own or use this type of device.
- Pressure-Demand: This respirator maintains a continuous positive pressure within the facepiece, thus preventing leakage into the facepiece.
- Continuous Flow: This respirator maintains a continuous flow of air through the facepiece and prevents leakage into the facepiece. The air supply for this type of respirator is usually associated with an air compressor.

4.3.3 SELF-CONTAINED BREATHING APPARATUS

This type of respirator allows the user complete independence from a fixed source of air and offers the greatest degree of protection but is also the most complex. Training and practice in its use and maintenance is essential. This type of device will be used in emergency situations or where USEPA Level A or B protection is required.

4.3.4 AIR QUALITY FOR SUPPLIED-AIR RESPIRATORS

When any form of supplied-air respirator is used, the breathing air supply shall meet or exceed the ANSI/Compressed Gas Association (CGA-GZ.1-1989) Standards for Grade D breathing air. This air quality must be verified with the air supplier and/or tested in the field for quality control purposes. Consult with IHSC for the latest protocol.

4.4 IDENTIFICATION OF RESPIRATOR CARTRIDGES AND GAS MASK CANISTERS

Respirator cartridges and canisters are designed to protect against individual or a combination of potentially hazardous atmospheric contaminants, and are specifically labeled and color coded to indicate the type and nature of protection they provide.

The NIOSH approval label on the respirator will also specify the maximum concentration of contaminant(s) for which the cartridge or canister is approved. For example, a label may read:

"DO NOT WEAR IN ATMOSPHERES IMMEDIATELY DANGEROUS TO LIFE. MUST BE USED IN AREAS CONTAINING AT LEAST 20 PERCENT OXYGEN. PROTECT AGAINST ATMOSPHERES CONTAINING MORE THAN ONE-TENTH PERCENT ORGANIC VAPORS BY VOLUME. REFER TO COMPLETE LABEL ON RESPIRATOR OR CARTRIDGE CONTAINER FOR ASSEMBLY, MAINTENANCE, AND USE."

4.5 WARNING SIGNS OF RESPIRATOR FAILURE

Particulate Air-Purifying

When breathing difficulty is encountered with a filter respirator (due to partial clogging with increased resistance), or if any irritation or odor is sensed in the mask, the filter(s) must be replaced and/or the facepiece checked for detection or missing valves. The employee is required to leave the area immediately to a safe area and service the respirator.

Gas or Vapor Air-Purifying

If, when using a gas or vapor respirator (chemical cartridge or canister), any of the warning properties (e.g., odor, taste, eye irritation, or respiratory irritation) occur, promptly leave the area and check the following:

- Proper face seal;
- Damaged or missing respirator parts; and
- Saturated or inappropriate cartridge or canister.

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If no discrepancies are observed, replace the cartridge or canister. If any of the warning properties appear again, the concentration of the contaminants may have exceeded the cartridge or canister design specification. When this occurs, an airline respirator or SCBA is required.

Supplied-Air Respirator

When using an air line respirator, leave the area immediately when the compressor failure alarm is activated or if an air pressure drop is sensed. When using an SCBA, leave the area as soon as the air pressure alarm is activated or any irregularity is noticed.

5.0 RESPIRATOR TRAINING

All CRA field staff will receive training on the contents of the Respiratory Protection Program and their responsibilities under it. They will be trained on the proper selection and use, as well as the limitations of the respirator. Training also covers how to ensure a proper fit before use, and how to determine when a respirator is no longer providing the protection intended. IHSG provides training of respirator wearers in the use, maintenance, capabilities, and limitations of respirators initially upon assignment of personnel to tasks requiring the use of respirators. The initial training is incorporated into the required 40-hour Hazmat training and through other courses if the 40-hour Hazmat training is not applicable to an individual's job tasks. Retraining is given annually thereafter and only upon successful completion of the medical evaluation and is incorporated into the Hazmat annual refresher program or other CRA training programs.

The training program, which is also an integral part of the HASP, will include the following:

- The CRA respirator program and regulatory standards;
- Nature and degree of respiratory hazards;
- Fit testing and user fit checking;
- Respirator selection, based on the hazard and respirator capabilities and limitations;
- Donning and doffing procedures, fit tests, and hands-on practice;
- Emergency use procedures;
- Care of the respirator (e.g., need for cleaning, maintenance, storage, and/or replacement); and
- Use and limitations of respirators.

Respirator training will be properly documented and will include the type and model of respirator for which the individual has been trained and/or fit tested.

6.0 RESPIRATOR FIT TESTING

A fit test shall be used to determine the ability of each individual respirator wearer to obtain a satisfactory fit with any air-purifying respirator. Quantitative or qualitative fit tests will be performed only after the successful completion of a physical exam. Personnel will only be issued respirators for which they have been fit tested.

No employee is permitted to wear a negative-pressure respirator in a work situation until he or she has demonstrated that an acceptable fit can be obtained. Respirator fitting is conducted initially upon assignment to a task requiring use of a respirator.

Fit testing will be conducted by the IHSG in accordance with Appendix A of 29 CFR 1910.134. The test results will be the determining factor in selecting the type, model, and size of respirator for use by each individual respirator wearer. Refitting is conducted annually thereafter or at the request of an employee (e.g., after a change in body weight, facial scarring, etc.). Only the current fit test is considered valid for respirator selection and certification purposes. Prior year(s) test results are maintained on file by IHSG for documentation completeness.

6.1 FIELD FIT CHECKING

Each time a respirator is donned, the user will perform positive and negative pressure fit checks to verify that the respirator is sealed correctly and that there are no gross abnormalities (e.g., missing exhalation or inhalation valves). These field checks are not intended to be a substitute for quantitative or qualitative fit testing. Respirator users must be properly trained in the performance of these field checks and understand their limitations.

6.1.1 NEGATIVE PRESSURE CHECK

Applicability/Limitations: This test cannot be carried out on all respirators; however, it can be used on facepieces of air-purifying respirators equipped with tight-fitting respirator inlet valves and on atmosphere supplying respirators equipped with breathing tubes which can be squeezed or blocked at the inlet to prevent the passage of air.

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6.4 SPECIAL PROBLEMS

Facial Hair

No attempt will be made by CRA to fit test an employee who has facial hair which comes between the sealing periphery of the facepiece and the face, or if facial hair interferes with normal functioning of the exhalation valve of the respirator. When a fitted respirator is worn to conduct work in the field, it is the worker's responsibility to be clean shaven (less than 1 day's growth) in order to obtain an adequate respirator fit which is representative of the fit test. Violators of this requirement are subject to disciplinary action.

Glasses and Eye/Face Protective Devices

Proper fitting of a respiratory protective device facepiece for individuals wearing corrective eyeglasses or goggles may not be established if temple bars or straps extend through the sealing edge of the facepiece. If eyeglasses, goggles, face shield, or welding helmet must be worn with a respirator, they must be worn so as not to adversely affect the seal of the facepiece. If a full-facepiece respirator is used, special prescription glasses inserts are available if needed.

6.5 RECORDKEEPING

Respirator fit testing shall be documented and shall include the type of respirator, brand name and model, method of test and test results, test date, and the name of the instructor/tester. The IHSG will be responsible to maintain and keep fit testing records on file.

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Procedure: Close off the inlet opening of the respirator's canister(s), cartridge(s), or filter(s) with the palm of the hand, or squeeze the breathing air tube or block its inlet so that it will not allow the passage of air. Inhale gently and hold for at least 10 seconds. If the facepiece collapses slightly and no inward leakage of air into the facepiece is detected, it can be reasonably assumed that the respirator has been properly positioned and the exhalation valve and facepiece are not leaking.

6.1.2 POSITIVE PRESSURE CHECK

Applicability/Limitations: This test cannot be carried out on all respirators; however, respirators equipped with exhalation valves can be tested.

Procedure: Close off the exhalation valve or the breathing tube with the palm of the hand. Inhale gently. If the respirator has been properly positioned, a slight positive pressure will build up inside the facepiece without detection of any outward air leak between the sealing surface of the facepiece and the face.

6.2 QUALITATIVE FIT TESTING

Federal regulations (29 CFR 1910.134) require at least qualitative fit tests of respirators and describe step-by-step procedures. This test checks the subject's response to a chemical introduced outside the respirator facepiece. The response is either voluntary or involuntary depending on the chemical used. Several methodologies may be used. The two most common are the irritant smoke test and the odorless vapor test. Fit tests will only be conducted by trained individuals certified by the IHSG to perform such testing. The procedures listed in Appendix A of 29 CFR 1910.134 will be followed.

Irritant Smoke

The irritant smoke test is an involuntary response test. Air-purifying respirators must be equipped with a high efficiency particulate air (HEPA) or a 100 series particulate filter (P, R, N) for this test. An irritant smoke, usually sodium chlorate, is directed from a smoke tube toward the respirator. If the test subject does not respond to the irritant smoke after conducting a series of exercises, a satisfactory fit is assumed to be achieved. Any response to the smoke indicates an unsatisfactory fit and the test is concluded.

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The chemical smoke is irritating to the eyes, skin, and mucous membranes. It should not be introduced directly onto the skin. The test subject must keep his or her eyes closed during the testing if a full-facepiece mask is not used.

Odorous Vapor

The odorous vapor test is a voluntary response test. It relies on the subject's ability to detect an odorous chemical while wearing the respirator. Air-purifying respirators must be equipped with an organic cartridge or canister for this test. Isoamyl acetate (artificial banana oil) is the usual test. An isoamyl acetate-saturated gauze pad is placed near the facepiece-to-face seal of the respirator of the test subject's skin. If the test subject is unable to smell the chemical after conducting a series of exercises, then a satisfactory fit is assumed to be achieved. If the subject smells the chemical, the fit is unsatisfactory.

If the subject cannot smell the chemical, the respirator will be momentarily pulled away from the subject's face. If the subject is then able to smell the chemical, a satisfactory fit is assumed. If the subject cannot smell the chemical with the respirator pulled away from the face, this test is inappropriate for this subject, and a different test will be used.

This test is limited by the wide variation of odor thresholds among individuals and the possibility of olfactory fatigue. Since it is a voluntary response test, it depends upon an honest response.

6.3 QUANTITATIVE FIT TESTING

Quantitative fit testing, using the Portacount Plus (condensing nuclei counter) fit test system, is generally performed on both full-face and half-face negative pressure respirators within CRA. Fit factors are determined by comparing the particle concentration outside the respirator with the concentration inside the respirator facepiece. An acceptable fit is achieved when the respirator wearer successfully completes a series of programmed exercises with a fit factor of 100 or more for half-mask devices, and 1,000 or more on full-face devices. The procedures in Appendix A of 29 CFR 1910.134 will be followed.

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7.0 MAINTENANCE AND ISSUANCE OF RESPIRATORS

7.1 MAINTENANCE

The maintenance of respiratory protective devices involves a thorough visual inspection for cleanliness and defects (i.e., cracking, rubber deterioration of straps, defective exhalation and inhalation valves, broken or cracked lenses, etc.). Worn or deteriorated parts will be replaced prior to use. No respirator with a known defect is released for use. No attempt is made to replace components, make adjustments, or make repairs on any respirator beyond those recommended by the manufacturer. Under no circumstances will parts be substituted, as such substitutions will invalidate the approval of the respirator. Any repair to reducing or admission valves, regulators, or alarms will be conducted by either the manufacturer or a qualified trained technician.

7.2 CLEANING OF RESPIRATORS

All respirators in routine use shall be cleaned and sanitized on a periodic basis. Respirators used non-routinely shall be cleaned and sanitized after each use and filters and cartridges replaced. Routinely used respirators are maintained individually by the respirator wearer. Replacement cartridges and filters are obtained by contacting IHSG. Cleaning and disinfection of respirators must be done frequently to ensure that skin-penetrating and dermatitis-causing contaminants are removed from the respirator surface. Respirators maintained for emergency use or those used by more than one person must be cleaned after each use by the user.

The following procedure is recommended for cleaning and disinfecting respirators:

- Remove and discard all used filters, cartridges, or canisters.
- Remove speaking diaphragms, valve assemblies, and hoses.
- Wash facepiece and breathing tubes in a cleaner-disinfectant solution (usually purchased from the respirator manufacturer) in warm water (49°C [119°F] maximum). A soft hand brush may be used to remove dirt.
- Solvents which can affect rubber and other parts shall not be used.
- Rinse completely in clean, warm water. If the cleaner does not contain a disinfecting agent, respirator components can be immersed for 2 minutes in 1 milliliter bleach to 1 liter of warm water. Rinse again.

- Hand dry with a lint-free cloth or air dry in a clean area in such a way as to prevent distortion of the facepiece.
- Clean other respirator parts as recommended by the manufacturer.
- Inspect valves, head straps, and other parts to ensure proper working condition.
- Reassemble respirator and replace any defective parts.
- After drying and inspection, place in a clean, dry plastic bag or other suitable container for storage.

7.3 ISSUANCE OF RESPIRATORS

Respiratory protective equipment shall not be ordered, purchased, or issued to personnel unless the respirator wearer has received a physical, respirator training, and a fit test. New employees who require respiratory protective equipment must be placed into the respirator program before being issued equipment.

IHSG provides an assortment of types of devices. These facepieces have a variety of cartridges that may be worn with them. At the time of issue, the appropriate cartridge is determined, based on the user's needs, and is issued with the appropriate facepiece.

7.4 STORAGE

After inspection, cleaning, and any necessary minor repairs, store respirators to protect against sunlight, heat, extreme cold, excessive moisture, damaging chemicals, or other contaminants. Respirators placed at stations and work areas for emergency use shall be stored in compartments built for that purpose, shall be quickly accessible at all times, and will be clearly marked. Routinely used respirators, such as full-face air-purifying respirators, shall be placed in sealable plastic bags. Unused cartridges should be removed from the facepiece and also stored in an airtight, sealable plastic bag. Respirators may not be stored in such places as tool boxes, equipment cases, or vehicles. Respirators shall be packed or stored so that the facepiece and exhalation valves will rest in a normal position, not be crushed and stored away from temperature extremes.

8.0 PROGRAM SURVEILLANCE

The ANSI Z89.2-1980 document entitled "Practices for Respiratory Protection" specifies:

"Section 3.5.15, Respirator Program Evaluation: An appraisal of the effectiveness of the respirator program shall be carried out at least annually. Action shall be taken to correct defects found in the program."

The evaluation of the Respirator Program will include investigating wearer acceptance of respirators, inspecting respirator program operation, and appraising protection provided by the respirator. Evidence of excessive exposure of respirator wearers to respiratory hazards will be followed up by investigation to determine why inadequate respiratory protection was provided. The findings of the respirator program evaluation will be documented, and this documentation will list plans to correct faults in the program and set target dates for the implementation of the plans. These evaluations will be conducted by IHSG at least annually.

8.1 PROGRAM REVIEW

The last date that this program was reviewed in its entirety was July 2002.

9.0 RECORDKEEPING

A written copy of this program and the OSHA standard is available to all employees and can be obtained by contacting the IHSG.

The records generated by this program (training, fit testing, medical) shall be maintained by the IHSG.

APPENDIX M

ISSG's RADIOLOGICAL HEALTH AND SAFETY PLAN

Radiological Health and Safety Plan

For

Thorium Milligation
At
247 East Ohio Street
Chicago, Illinois

Prepared for

CRA

By

ISSG
6312 WEST OAKTON STREET
MORTON GROVE, ILLINOIS

January 2, 2004

H:\OCH\400001\Health Physics\CRA\OCH\HSP - 247 East Ohio\HSP - 142.doc

RADIOLOGICAL HEALTH AND SAFETY PLAN

Title: Radiological Health and Safety Plan
Revision Number: RSSI 1.4

RSSI

PHONE NUMBERS

IN THE EVENT OF AN EMERGENCY DIAL 911

AMBULANCE SERVICE	911
FIRE DEPARTMENT	911
EMERGENCY RESPONSE SERVICE	911
POLICE DEPARTMENT	911
NATIONAL RESPONSE CENTER	1-800-424-9002
POISON CONTROL CENTER	1-800-732-2200
HOSPITAL - For Ambulatory Blood Bank and Northern Memorial Hospital (See Project Safety Plan for Maps)	312-767-2200
ENVIRONMENTAL NUCLEAR SAFETY, HAZARDOUS WASTE MANAGEMENT AGENCY (HNS), RADIATION EMERGENCY NUMBER	215-742-7800
PROPERTY HEALTH PHYSICIST, FIRE and ON-SITE HEALTH PHYSICIST, Sangha Nagar - 24 Hour Emergency Number	817-465-1000
HEALTH AND SAFETY COORDINATOR - On-call On-Site Safety, Brian McGowan	773-960-0933
ABRAMSON NATIONAL LABORATORY - Whole Body Counting	630-292-5130

RSSI

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EMERGENCY PLAN

In the event work within the potentially impacted area into specific areas required in an emergency, the following shall be incorporated to the extent possible, and all personnel working in the potentially impacted areas shall be given the opportunity to read this section of the Radiological Health and Safety Plan (RHASP).

- A. **PROJECT WORKERS POTENTIALLY EXPOSED TO CONTAMINATED MATERIAL**
 1. Notify workers that levels of radiation above background levels may be present
 2. Avoid inhaling or ingesting dust from contaminated areas
 3. Minimize contact with contaminated material
 4. Wear protective coveralls or disposable coveralls to facilitate decontamination of workers
 5. Survey soil and other material for contamination
- B. **AVOID SPREAD OF CONTAMINATION**
 1. Avoid contact of clothing of contaminated material
 2. Cover soil and avoid contact for contamination
 3. Survey soil and debris prior to transport away from project area
 4. Do not remove equipment which has been in contact with potential contamination until it has been surveyed and released
- C. **MINIMIZE POTENTIAL PUBLIC CONTACT**
 1. Limit access to road and debris
 2. Cover soil and debris to minimize fugitive dust
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- D. **MONITOR CONTAMINATION**
 1. Survey soil and material before release
 2. Provide high volume air samples to monitor for fugitive emissions
 3. Survey soil and material before release
 4. Survey soil and material before release
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- E. **DISPOSAL**
 1. Soil and debris shall be disposed of as required by law
- F. **NOTIFY AUTHORITIES**
 1. Notify agencies identified in the contract emergency notification list
 2. Notify agencies identified in the contract emergency notification list
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TABLES

TABLE 1-1	ACTION LEVELS AND DETERMINED BY RADIOACTIVITY
TABLE 1-2	ACTION LEVELS
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FIGURE 1-2	DISPATCH AND WHERE CONTAMINATION HAS BEEN FOUND
FIGURE 1-3	DISPATCH AND WHERE CONTAMINATION HAS BEEN FOUND
FIGURE 1-4	DISPATCH AND WHERE CONTAMINATION HAS BEEN FOUND
FIGURE 1-5	DISPATCH AND WHERE CONTAMINATION HAS BEEN FOUND
APPENDICES	
APPENDIX A	

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1.0 SCOPE OF PLAN

The following Radiological Health and Safety Plan (RHASP) will be used and modified as necessary in order to minimize and prevent exposures to them and their daughters at 247 East Third Street, Chicago, Illinois. All personnel assigned to this project will be required to review thoroughly the contents of the RHASP and to follow these policies and procedures. This RHASP is for use only by CRA, their designated contractors and consultants, and approved site visitors. Employees of Regulatory agencies are not considered visitors and will be required to conform to their agency's Health and Safety Plan.







This plan meets the requirements of CRSA 32 CFR 1910.106, Limiting Radiation, 32 CFR 1910.340, Standards for Protection Against Radiation, 32 CFR 1910.341, Notices, Instructions, and Reports to Workers, Inspectors. Visitors will be required to review the Radiological Health and Safety Plan and read and sign the entrance information sheet (Figure 1-1).


This plan primarily applies to radiological health and safety. The project safety plan addresses additional project health and safety issues and they should be used together for safe performance of this work. In addition, the CRA Logistics and Operation Plan provides descriptions of several safety measures.

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
I

CAUTION Radiation hazards are present on this site


 CAUTION  RADIATION AREA	 CAUTION  RADIOACTIVE MATERIAL	 CAUTION  AIRBORNE RADIOACTIVITY
---	---	---




Wear mask, protective clothing in controlled areas




Use mobile phones in controlled areas




No smoking, eating, drinking or chewing in uncontrolled areas




Use only authorised personnel in controlled areas




Use only authorised personnel in controlled areas



No smoking, eating, drinking or chewing in uncontrolled areas or controlled areas



No drinking, eating, drinking or chewing in uncontrolled areas or controlled areas



No mobile phone use in controlled areas

The following safety management structure will be used for the implementation, administration, and monitoring of the RHASP. This plan applies to radiological health and safety. The CRA Work Plan contains additional information about construction safety and other health and safety.

The Health and Safety Coordinator (HSC) has responsibility for overall on-site safety and for implementing the site Health and Safety Plan (HASP).

The Project Health Physician (PHP) shall be responsible for the RHASP. The PHP and the On-Site Health Physician (OHP) who reports to the PHP, have the authority to alter, modify, suspend or terminate work that the PHP or the OHP judges to be a threat to health, safety or the environment, or to be a violation of applicable rules and regulations. The OHP or designee shall monitor and maintain quality of the RHASP until project completion.

- Review project background data
- Approve all RHASO modifications
- Conduct required on-site training

- Administer and enforce the RHASP.
- Evaluate the adequacy of personal protective equipment (PPE).
- Brief visitors on site conditions, and
- Administer surveys and personnel air monitoring procedures.

The following are potential radiological hazards that may be present or associated with this project:

- Thorium-232 (Th-232) and its progeny including
- Radium-226 (Ra-226)

The contaminants are known to be present in the soil at low concentrations. They may be present in other materials. The primary routes of entry into the body are:

ROUTE	SOURCE
Inhalation	Rn-222 and Rn-220 progeny in surface dust, and Rn-220 and its progeny in air
Ingestion	Dust and aerosol containing Rn-220 and Rn-220 progeny
Eye and Skin	Direct contact Cuts and abrasions
External	Penetrating radiation from alpha emitters in soil and other material

The OHP will administer and supervise the RHAS² at the work-site level. The OHP will monitor all operations, be the primary, on-site contact for radiological health and safety issues, and have full authority to alter, suspend, modify, or terminate any activity if conditions are judged to be hazardous to on-site personnel or the public.

The PHIP will brief all personnel on the contents of the RHASP. Personnel will be required to review the RHASP, and have the opportunity to ask questions about the planned work or hazards. The PHIP or the CHIP will conduct toolbox safety meetings to familiarize site personnel with site conditions, boundaries, and physical hazards. Site personnel will conduct their assigned tasks in accordance with the RHASP at all times.

All individuals have a primary responsibility for their own health and safety and the health and safety of others. If, at any time, site personnel observe radiological conditions, which could jeopardize personnel health and safety, they are required to immediately report their observations to the CRIP.

All field project personnel shall receive a medical evaluation in accordance with 29 CFR 1910.120. Personnel who receive a medical evaluation will be provided the results of their evaluation by the medical contractor. This will be in the form of a confidential report addressed to the individual and will contain a breakdown of the clinical findings. In addition, it will indicate any areas of concern which would justify further medical consultation by the individual's personal physician. In the event that the areas of concern are of a severe nature, a follow-up notification will be made to the individual by the medical consultant to answer any questions the employee may have.

All project personnel shall participate in a dosimetry program administered by the PHP. The dosimetry processor shall be accredited by the National Voluntary Laboratory Accreditation Program. The PHP shall maintain records of all radiation doses received by field personnel, including all contractors. These records shall comply with the requirements of 32 [AC 240.401]. The PHP shall review the results of personal exposure monitoring to determine compliance with exposure limit requirements.

Personal dosimetry is required for an individual who, while on-the-job, may receive in one calendar quarter a dose in excess of 10% of the limits in 29 CFR 1910.1046(b)(1). All individuals working in a Radiation Area or in an exclusion zone shall be issued and shall be required to wear a thermoluminescent dosimeter (TLD) or an optically stimulated luminescence (OSL) dosimeter.

Biassay is the determination of the types and amounts of radioactive materials, which are in the body. By analyzing the deposition, the excretion, and any other available information regarding placement in the body internal exposures from radioactive materials can be estimated.

Based on levels documented by assays are not likely to be required for the proposed mitigation activities. The determination of a need for bioassay will be based on air monitoring, review, and by recommendations from the HHP. If necessary, Argonne National Laboratory will be requested to perform whole body counting.

First aid for minor injuries should be administered on-site if possible. The individual should be discontinued if necessary and possible without compromising first aid, depending on the severity of the injury, and transported to the nearest medical facility, if needed.

Treatment of the injury is of primary concern and decontamination is secondary. The reported levels of radioactive contamination do not represent a significant hazard if decontamination can not be undertaken until a medical emergency is resolved. The OJH will complete the appropriate incident report, if warranted. See Section 4.2, Accident and Incident Reporting.

An emergency first-aid station will be established and will include a first-aid kit for on-site emergency first aid.

Provisions for emergency medical treatment shall include:

- At least one individual qualified to render first aid and cardiopulmonary resuscitation (CPR) will be assigned to each shift.
- Emergency first aid stations will be established in the immediate work vicinity.

- #### 4.3 ACCIDENT AND INCIDENT REPORTING

All accidents, injuries, or incidents will be reported to the HSC and the OHP. The accident/incident will be reported as soon as possible to the employee's supervisor. An accident/incident form will be completed by the OHP, and a copy will be forwarded to the Construction Manager. A copy of the form is shown in Figure 4.1.

FIGURE 4.1 (PAGE 1 OF 3)
ACCIDENT/EXPOSURE INVESTIGATION REPORT

INVESTIGATION FORM
 DIVISION OF SOCIAL & HUMAN SERVICES
 DATE: _____
 CITY: _____ AREA: _____ JOB CODE NUMBER: _____
 DEPARTMENT & LOCATION: _____
 ACCIDENT DATE & TIME: _____
 DATE & TIME AS CORRECTED TO: _____
 NATURE OF INCIDENT: _____
 NATURE OF INJURY: _____
 REPORTED TO SUPERVISOR: YES ☐ NO ☐
 I HAVE THE FOLLOWING TO VIEW: YES ☐ NO ☐
 I HAVE THE FOLLOWING TO VIEW: YES ☐ NO ☐
 I HAVE THE FOLLOWING TO VIEW: YES ☐ NO ☐
 WITH COMMENTS: _____
 I WITNESSED THE INCIDENT/STATEMENTS: ATTACHED ☐
 I WITNESSED THE INCIDENT/STATEMENTS: ATTACHED ☐
 I WITNESSED THE INCIDENT/STATEMENTS: ATTACHED ☐
 EQUIPMENT INVOLVED: ATTACHED: YES ☐ NO ☐
 ACCIDENT EQUIPMENT INCIDENT DESCRIPTION: _____

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5.0 TRAINING

All site personnel shall be trained and certified in accordance with 29 CFR 1910.120.

5.1 PROJECT-SPECIFIC TRAINING

Prior to project start-up, all assigned personnel shall receive an initial project-specific training session. This training shall include, but not be limited to, the following areas:

- Review of the Radiological Health and Safety Plan.
- Review of applicable radiological and physical hazards.
- IVE levels to be used by site personnel.
- Site access control.
- Emergency response and evacuation procedures.
- Project communication.
- Required decontamination procedures.
- Prohibited on-site activities.
- Instructions to workers in accordance with 32 IAC 400 and 29 CFR 1910.119(d)(2), and
- U.S. NRC's Regulatory Guide 8.13 and Dual-Use Pregnant Worker Policies

5.2 VISITOR ORIENTATION

All non-essential personnel and visitors who plan to enter the exclusion zone will be briefed on the RIASP requirements and the requirements in 32 IAC 401.120 and 29 CFR 1910.119(h)(2) requirements prior to entry with a trained site escort. In addition, female visitors will be instructed regarding U.S. NRC Regulatory Guide 8.13 and

5J RADIATION SAFETY TOOLBOX MEETINGS

Before the start of the week, and, on the first work day of each following week, the OJHP will assemble the site personnel for a brief radiological safety meeting. The purpose of these meetings will be to discuss project status, problem areas, conditions, safety concerns, PPE levels and to reiterate RHA/ASH requirements. The OJHP will complete a Radiological Safety Meeting Report (Figure 5-1) to indicate the contents of the meeting and the attendees.

54 FIRST AID

At least one (1) individual trained and qualified to administer first aid and CPR in accordance with American Red Cross requirements, will be present at the site.

FIGURE 4-1 (PAGE 2 OF 3)
ACCIDENT/EXPOSURE INVESTIGATION REPORT

AT CRIME DESCRIPTION				AT IDENTIFICATION NUMBER INVESTIGATION REPORT			
DATE & TIME				LOCATION			
PRELIMINARY ACTION RECOMMENDATIONS							
CORRECTIVE ACTIONS COMPLETED		MANAGER RESPONSIBLE		DATE COMPLETED			
DATE COMPLETED TIME TEMPORARY FILE CLOSURE REPAIR DISPOSITION ALTIMETER INVESTIGATION COMPLAINT TOTAL COST							
Address: _____ PROPERTY OF: _____ REPORT PREPARED BY: _____ DATE COMPLETED: _____							
SUPERVISOR'S REVIEW () YES () NO DATE REVIEWED: _____							
COMMENTS: ACTION _____ DATE: _____							
SAFETY COMPLAINTS AND OTHERS: PAYABLE _____ DATE: _____							
SAFETY DEVIATION SERVICE: _____							

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FIGURE 5.1 (PAGE 1 OF 2)

RADIOLOGICAL SAFETY MEETING REPORT

DATE	DISCUSS	DISCUSSANT	To be filled out by Meeting Facilitator	
			1. AKA	1. To
			2. FBE	2. P
MEETING PURPOSE	MEETING AGENDA	AGENDA ITEM DESCRIPTIONS	1. Are you meeting this Requirement? Yes/No 2. What is your plan to meet this Requirement? Yes/No	
SEVEN DAYS OF PRACTICE/ATION	Did you do any Seven Days of Work Practice, Materials, Practitioner, Hazards, Equipment Evaluation, etc.			
EIGHT DAYS PRACTICE	Complaints, Questions, Comments, Etc.			
NINE DAYS COMPLETION OF ACTION PLAN	Know if you are in compliance. Report on Green, Yellow or Red. Do this with Incident Report. If you cannot, then go to your Supervisor or instructor.			
EIGHTEEN DAY HEAD COMPLETION				
SEVEN DAYS FACILITY MANAGER			FACILITY MANAGER'S NAME: HAVE FACILITY ATTENDING SIGN ON FACILITY SIGN.	

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[illegible]

Personnel shall not be exposed on 10 working hours, to airborne radioactivity in excess of 12 Maximum Permissible Concentration (MPC)-hours without prior approval of the PPH or the OSHA. The MPC incorporated in 29 CFR 1910.106a are those that were in Table 1 of appendix B of 10 CFR 20 in 1974 when OSHA promulgated the standard. Level of protection may be increased to full-face or purifying respirators when airborne monitoring indicates that airborne concentrations of radioactive material reached 30% of the MPC. All personnel shall incorporate ALARA principles. Engineering controls shall be used prior to increasing the level of respiratory protection equipment.

[illegible]

Monitoring for airborne radioactivity exposure requires the following elements:

- Air sampling for radioactive particulates.
- Recordkeeping regarding personnel work, locations and time in location, and
- Respiratory protective equipment records regarding devices used by workers in airborne radioactivity.

By monitoring these three elements, a continuous record of personnel exposure to airborne radioactivity is maintained.

Personal samplers will be used to monitor for occupational exposure to airborne radionuclides. Samples shall be analyzed daily to determine potential contributions to dose from radionuclides. Additional evaluation of samples shall be performed when necessary after allowing time for decay of interfering radionuclides.

Environmental monitoring of the work areas will be performed for radioactive particulate activity. Area air samples will be run continuously in and outside of exclusion zones. High volume grab samples shall be run each day out of exclusion zones to provide grab measurements of airborne contaminants. Samples shall be analyzed daily for gaseous activity. Background data and preexclusion data shall be collected at the location selected for sampling prior to the start of activities. The activities of these samples will be determined prior to removal of fallout. Additional analysis of air samples shall be performed when necessary after activities start for the purpose of determining if the samples shall be analyzed. Samples shall be analyzed when they have a MDA below the activity in the collected effluents at the concentration limits. Air samples shall be collected on 11 μ m membrane or 0.1 μ m glass fiber media. Laboratory analysis of air samples shall be performed using an ambient proportional counter, alpha scintillation detector, or alpha spectrometer. Field analysis of air samples shall be performed using an alpha scintillation detector.

Internal monitoring to determine intakes of radioactive material will be performed as needed, based upon the results of the air sampling program. Diagnostic methods may be in-vivo (whole body counting) or in-vitro. Routine bioassay of workers is not anticipated based upon the low concentrations of radioactivity in soil that is being removed.

External radiation monitoring of workers will be performed using the dosimeters provided and processed by a service holding National Voluntary Laboratory Accreditation Program (NVLAP) certification. Direct reading pocket dosimeters will be used for visitors and other infrequent personnel requiring access to the site.

Radiological surveys will be performed to ensure that radiation levels and contamination levels are controlled to the action levels in Table 6.1 for workers and the general public. Radiation surveys will consist of ambient gamma surveys and contamination surveys.

The values listed in 32 FAC 340 APPENDIX C, A Decontamination Guidelines are used in determining that equipment and CEA controlled materials are suitable for release for unrestricted use. These are not the same as the Acceptable Radiation Level (ARL) used to measure the success of mitigation activities.

gamma 250 micrometers per hour at 1 cm from surface
gamma radiation measured at a distance of 100 centimeters from the surface
shall not exceed background

Surveys of CRA equipment and material shall be performed to ensure that radioactivity is below the action levels in Table 6.1 before leaving the site. Decontamination will be performed to maintain contamination levels ALARA.

Site personnel shall be surveyed by the OHP when exiting exclusion zones to ensure that contamination in excess of 10 times the action levels in Table 6.1 is not present on skin or clothes. The OHP will be immediately informed if contamination is detected.

Site personnel shall be surveyed by the HHP when entering confinement zones to ensure that contamination on faces or T-shirts does not lead to ingestion as shown in Table 6-1. If not wearing gloves or clothes, face HPP will be immediately informed about any contamination on individuals and will recommend appropriate decontamination techniques. Proper disposal of contaminated personal effects and clothing must be performed according to the site's waste management plan. If required, surface contamination surveys will be performed with a portable, proportional, non-proportional, or alpha scintillation probe. Surveys for removable contamination shall be performed by wiping the surface with wipe test material and analyzing the wipe. Laboratory analysis of wipes shall be performed at the discretion of the HHP. The HHP may also perform direct counts with a handheld detector. The HHP shall be performing an alpha scintillation detector, or a portable probe. Dose rates shall be measured using a track action level multiplying ion chamber. Exposure rate shall be measured using an energy compensated

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Radiological exposure of on-site workers will be determined by external dosimetry and by air sampling. The OHP will perform radiological monitoring. Action levels are in Table 6.1.

Engineering controls such as the use of water to minimize dust levels will be implemented as necessary during mitigation activities. See the CRA Work Plan.

It is anticipated that most activities outside exclusion zones will be performed using Section 1 personal protective equipment (PPE) with a contingency for upgrade, based on the action levels listed in Section 6. Section 2 equipment will be used when in an exclusion zone, or when directed by the OHP.

1. Take a note during exsiccation:
 - a. Hand book
 - b. Safety glasses
 - c. Steel toe boots with metatarsal protection
 - d. Cotton overalls
 - e. Leather gloves
 - f. Full body harness with lanyard (if exposed to a tall hazard - tree)
 - g. Earplugs (if moving around loud equipment - i.e. electric saws, pneumatic hammers, etc.)
2. Take a note on exsiccation zones:
 - a. Hand book
 - b. Safety glasses
 - c. Steel toe boots with metatarsal protection
 - d. Work suit
 - e. Respirator (if affected by tall H2S) (H2S)
 - f. Nitrogen gas (canister or leather duff) when handling herb or other material or equipment
 - g. Earplugs (if moving around loud equipment - i.e. electric saws, pneumatic hammers, etc.)

Action levels used to determine the need to upgrade or downgrade the levels of protection are described in Section 6 of this RHASP.

8.0 CONTAMINATION REDUCTION PROCEDURES

8.1 EQUIPMENT DECONTAMINATION

Equipment will be decontaminated using water, and if necessary, a detergent solution. A need for chemical cleaning is not anticipated.

8.2 PERSONNEL DECONTAMINATION

If surveys indicate that individuals have been decontaminated by removing protective coveralls and showering, they may leave the work site. If individuals cannot be decontaminated by the removal of coveralls and showering, they will be evaluated by the CHD.

If skin contamination in excess of the ALN values in Table 6-2 is measured on an individual working with radioactive materials, the following specific procedures should be used to remove the material on the skin as absorption of the radioactivity through the skin.

Immediate Action: Notify the CHD and CRA's Safety Manager, who will supervise the decontamination. If contamination is severe, the CHD will supervise the cleaning of the individual's skin with soap and water. If the contamination is general, the CHD will recommend showering. Remove, dry, and monitor for radioactivity. This soap wash step may be repeated up to three times.

Evaluation: If the above procedure fails to remove all the skin contamination, an evaluation of the skin contamination should be performed by the CHD. This evaluation will identify the radioisotopes and quantity, and estimate the skin dose. If additional decontamination steps are necessary, they will be performed and documented by the CHD. The guidelines for personnel decontamination in the Radiological Health Handbook, HHS 1976, page 194, can be used as applicable. These guidelines are in Appendix A.

8.3 WORK ZONES

Work zones will be established at the site. These zones include clean support zones, decontamination zones, and confinement zones. Known contaminated areas where exclusion zones to be established during the mitigation are shown in Figure 1-1. Although the decontamination zones are anticipated to remain fixed, other zones will move as remediation work progresses. See the CRA Work Plan.

8.4 CONTAMINATION PREVENTION

Work practices that minimize the spread of contamination will reduce worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

- knowing the limitations of all personal protective equipment being used;
- avoiding walking through areas of known or suspected contamination;
- refraining from handling or touching contaminated materials directly (do not sit or lean on potentially contaminated surfaces);
- ensuring personal protective equipment has no cuts or tears prior to donning;
- inspecting all closures on suits and covering with tape if necessary;

- taking steps to protect against any skin injuries; and
- refraining from eating, chewing gum, smoking, or engaging in any activity from which contaminated materials may be ingested while in contaminated areas.

8.5 DISPOSAL PROCEDURES

All discarded materials, waste materials, or other field equipment and supplies should be handled in such a way as to avoid spreading of contamination, creating a sanitary hazard, or causing fires to be left on-site. All potentially contaminated waste materials (e.g., clothing, gloves) shall be monitored and segregated in accordance with monitoring results and either radioactive or non-radioactive waste. Required labels shall be affixed to containers of radioactive materials (i.e., CAUTION RADIOACTIVE MATERIALS).

Appendix A: Radiological Health Handbook Personnel Decontamination

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PERSONNEL DECONTAMINATION				
Medium	Surface	Action	Technique	Measurement
Body and water	Shin and hands	Decontamination and showering	Each 2-3 minutes, shower with soap and water. Do not use hairbrush. Do not use nail brush. Do not use nail polish. Do not use nail polish remover. Do not use nail polish.	Counting stations will read the entire body of the person. Do not use a hand-held counter.
Body and water	Body	Shower as above.	Shower with soap and water. Do not use hairbrush. Do not use nail brush. Do not use nail polish. Do not use nail polish remover. Do not use nail polish.	Counting stations will read the entire body of the person. Do not use a hand-held counter.
Hand soap, self, brush, and water	Shin and hands	Decontamination and showering	Each 2-3 minutes, shower with soap and water. Do not use hairbrush. Do not use nail brush. Do not use nail polish. Do not use nail polish remover. Do not use nail polish.	Counting stations will read the entire body of the person. Do not use a hand-held counter.
Shin or other decontaminant (shin)	Shin and hands	Shower as above.	Shower with soap and water. Do not use hairbrush. Do not use nail brush. Do not use nail polish. Do not use nail polish remover. Do not use nail polish.	Counting stations will read the entire body of the person. Do not use a hand-held counter.

Shower with the first listed method and then proceed step by step to the next listed method, as necessary.

APPENDIX N

PERSONNEL DOSIMETRY

1.0 PURPOSE

This procedure describes the methods to be used for personnel dosimetry. Personnel dosimetry will be used to ensure the total dose to a worker, including doses resulting from all sources of radiation other than background radiation, does not exceed the standards for protection against radiation. The measurement data will be used to evaluate the effectiveness of health and safety measures at the work site.

2.0 SCOPE

This procedure applies to field activities that may expose workers to radiation doses from sources other than background radiation. Workers will be given dosimeters to monitor their dose levels. The objectives of the dosimetry program described in this plan are to monitor workers' exposure to radiation and keep the exposure levels as low as reasonably achievable (ALARA).

3.0 REFERENCES

- 32 Illinois Administrative Code 340 "Standards for Protection Against Radiation" Subpart F "Surveys and Monitoring"

4.0 EQUIPMENT AND MATERIALS

- Optically Stimulated Luminescence (OSL)
- Thermoluminescent Dosimeter (TLD)
- Film Badge
- Self-Reading Dosimeter

5.0 INSTRUCTIONS

5.1 DOSIMETRY

The Site Health Physicist maintains records of all radiation exposures incurred by personnel including all visits, contractors, and inspectors working at the site. These records are maintained in an up-to-date manner to comply with the requirements of 32 IAC 340.1160. The following records are kept for each worker exposed to radioactivity or radiation.

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- IDNS form 4 or equivalent listing worker's previous radiation exposure history.
- Records of previous radiation exposure as received from employers.
- IDNS form 5 or equivalent listing current occupational exposure for whole body, skin and extremities.
- Evaluations of lost or erroneous dosimeter, TLD, OSL, or film badge readings.
- Copies of all correspondence relating to the individual's radiation exposure records.

5.2 REQUIREMENTS FOR DOSIMETRY

Personnel dosimetry is required for anyone who enters a radiologically controlled area in which they may receive in one calendar quarter a dose to the body in excess of 312 millirem (mrem). Any person who enters or works in a radiation area will be required to have a personal dosimeter.

5.3 TYPES OF DOSIMETRY

5.3.1 OPTICALLY STIMULATED LUMINESCENCE (OSL)

The Optically Stimulated Luminescence (OSL) is a device used for measuring the total dose received by a person exposed to photon (x-ray and gamma ray), beta, and neutron radiation. An OSL badge measures radiation through a thin layer of aluminum oxide. During analysis, the aluminum oxide is stimulated with select frequencies of laser light causing it to become luminescent in proportion to the amount of radiation exposure. It gives accurate readings down to 1 mrem. This sensitivity is ideal for employees working in low-radiation environments and for pregnant employees.

An OSL badge is an integrated, self-contained packet that comes presealed, incorporating an Al₂O₃ strip sandwiched within a three-element filter pack that is heat sealed within a laminated, light-tight paper wrapper. All of these components are RF sealed inside a tamper-proof plastic blister pack. Mishandling, light leakage, or lost detection elements are eliminated.

OSL badges are unaffected by heat, moisture, and pressure when in clear blister packaging is uncompromised.

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dosimeters used for personnel monitoring, area monitoring and control badges. This log will also show return of exposed dosimeters to the processor for development when the exposure period has ended.

Control badges are used by the processor to measure and subtract the background exposure that the badges receive while in storage. It is important that control badges are stored with the other unused badges and that they are removed from and returned to the processor with the other badges. In case a control badge is damaged or additional control badges are needed, any badge may be designated as a control badge as long as it has been stored in the same manner as the other badges.

Dosimeter results received from the processor shall be retained. The reports constitute the permanent record of personnel occupational radiation exposure at the CRA work site. A timely review of the results determines completeness and compliance with all exposure limits.

5.4.2 SELF-READING DOSIMETER

Temporary employees, visitors or inspectors may be issued self-reading dosimeters for personnel monitoring if dosimetry is required. A log of all personnel issued a self-reading dosimeter shall be maintained.

Dosimeters are changed every day at the beginning of the shift if necessary. A dosimeter must be changed if the fiber is more than halfway across the scale or if it is less than 100 mR from the end of the scale.

5.4.2.1 CHARGING DOSIMETERS

The dosimeter is charged by pressing the dosimeter firmly onto the charging pedestal of the dosimeter charger. At the same time look into the dosimeter and adjust the control knob until the fiber image is at the zero mark on the scale. Remove the dosimeter and touch the charging pin lightly with a pencil point or small wire to eliminate the remaining electric charge on the charging pin. Read the dosimeter. This is the initial reading. Record the initial reading on the visitor dosimeter record.

Read the dosimeter periodically while working in a radiation area. Otherwise, read the dosimeter at the end of the work day or when leaving the site and record the final

The OSL, if used, must always be worn when in controlled areas. Normally the OSL will be worn in the vicinity of the left breast pocket or front of belt. It must not be shielded by other devices such as ID badges, pens or pencils, coins or keys.

Care will be taken that the OSL is not lost, damaged, or exposed to radiation except while being worn. The OSL provides the basis for the permanent radiation exposure history of the wearer. OSLs are not taken off site without the Health Physicist's approval.

5.3.2 THERMOLUMINESCENT DOSIMETER (TLD)

The Thermoluminescent Dosimeter (TLD) is a device used for measuring the total dose received by a person exposed to both photon (x-ray and gamma ray) and beta radiation.

Ionizing radiation striking electrons within the crystal lattice of lithium fluoride crystal chips raises electrons to higher energy levels where they become trapped. Later development by heating allows the electrons to return to their ground state. This process emits light photons. The quantity of light is directly proportional to the dose (in rad) received by the TLD. This solid state device is stable and capable of measuring doses over the practical range of Health Physics dosimetry.

The TLD, if used, must always be worn when in controlled areas. Normally the TLD will be worn in the vicinity of the left breast pocket or front of belt. It must not be shielded by other devices such as ID badges, pens or pencils, coins or keys.

Care will be taken that the TLD is not lost, damaged, or exposed to radiation except while being worn. The TLD provides the basis for the permanent radiation exposure history of the wearer. TLD badges are worn upright with the label away from the body. TLDs are not taken off site without the Health Physicist's approval.

5.3.3 FILM BADGE

The film badge is a device used to measure the total dose received by a person exposed to photon (x-ray and gamma ray) and beta radiation. Ionizing radiation striking silver atoms in the film emulsion causes excitation of the electrons in small clusters of silver atoms. Later processing chemically develops these clusters into silver grains in the emulsion. The optical density of the emulsion is read to determine the film dose. Correction must be made for energy, exposure level, emulsion number, development

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reading. Subtract the initial reading from the final reading and record the dose received for that wearing period.

5.5 FORMS AND RECORDS

Personnel monitoring records are important for several reasons. First, it is essential that the employee receive more exposure than is permitted by law. Second, records of radiation exposure may be used as the legal basis for the settlement of claims under workers' compensation laws or other legal proceedings. Third, the records are necessary for planning work and keeping radiation exposures as low as reasonably achievable (ALARA). Therefore, the records of issue and return of dosimetry must be done in a careful and businesslike manner, and all records concerning dosimetry must be maintained as permanent operating records. All records must be kept current.

The purpose of this procedure is to clearly explain how these forms are to be prepared. Ink should be used to fill out the forms. Avoid pencil, broad tip markers and water-soluble inks.

5.5.1 OCCUPATIONAL EXTERNAL RADIATION EXPOSURE HISTORY FORM, IDNS FORM 4 OR EQUIVALENT

The Occupational External Radiation Exposure History form is completed for each person who will perform work involving exposure to radiation. This form is filled out, signed and dated, and calculation of accumulated dose must be completed. Any individual worker's total exposure must not exceed 1250 mrem per quarter.

The employee completing the form completes the identification section at the top of the form. The full name should be given including the full middle name.

In the section of the form marked Previous History of Occupational Exposure the employee must list all of his previous employment where he was occupationally exposed to ionizing radiation. Employment during the current quarter should be listed separately at the top, and all earlier periods of exposure listed in order under the current quarter information. Period of employment and period of exposure should be listed to the nearest month and year. It is only necessary to list those places of employment where occupational radiation exposure occurred. The form is signed and dated. This signature is a certification of the accuracy of the information listed.

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time and temperature to evaluate the dose received by the person. Filters are used in various areas of the film to determine the energy and quality of the ionizing radiation.

The film badge, if issued, must always be worn when in specified controlled areas. Normally the film badge is worn in the vicinity of the left breast pocket or front of belt. It must not be shielded by other devices such as ID badges, pens or pencils, coins or keys.

Care must be taken that the film badge is not lost, damaged, or exposed to radiation except while being worn. The film badge is used to provide the permanent radiation exposure history for the wearer. Film badges are worn upright with the label away from the body. Film badges are not taken off site without the Health Physicist's approval.

5.3.4 SELF-READING DOSIMETER

Self-reading dosimeters operate on the principle of the gold-leaf electroscope. A quartz fiber is displaced electrostatically by charging it. An image of the fiber is focused on a scale and can be seen by looking through the dosimeter lens. Exposure of the dosimeter to photon (x-ray and gamma ray) discharges the fiber and the fiber will return to its original position. The amount of discharge and therefore the amount of change in the fiber position is proportional to the radiation exposure.

Self-reading dosimeters must be handled with care. Dropping the dosimeter may discharge it, making its reading go off scale. In this case, an evaluation of the exposure is made, and the dosimeter is recharged.

5.6 ISSUING DOSIMETRY

Personnel dosimetry will be issued for new employees and for visitors as required. An employee provided with personnel dosimetry must supply information as required on IDNS form 4 and IDNS form 5 or equivalents. This information will include name of the individual, social security number, date of birth and previous occupational radiation exposure history.

5.6.1 PERSONAL DOSIMETERS

Employees assigned to the CRA work site shall be issued personal dosimeters, if dosimetry is required. A log of dosimeters will be kept. This will include a record of

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To obtain records of exposure history from former employees, the individual must sign a release statement. Copies of the signed form are made and sent to previous employers as authorization for the release of the employee's dose history.

The total accumulated dose is determined from the history information based on available records of exposure or calculated exposure data for periods (in quarters) of exposure for which records are unavailable. Calculations for dose when records are not available are explained in 32 IAC 340.250. Copies of the records used are attached to the form.

5.5.2 CURRENT OCCUPATIONAL EXTERNAL RADIATION EXPOSURE RECORD, IDNS FORM 5 OR EQUIVALENT

A file of exposure received is maintained on each person who is issued a dosimeter. This Current Occupational External Radiation Exposure Record is used to record the personnel monitoring information for each person and it becomes the permanent file record of his/her exposure. Dosimeter processor reports fulfill this requirement if all necessary information is reported by the processor.

Required information includes a complete evaluation of the individual's dose received at the Removal Action work site. Whole body, skin and extremity doses are recorded. A running total for the calendar quarter and a lifetime accumulated dose evaluation are also required.

5.5.3 LOST OR DAMAGED DOSIMETER REPORT

If a dosimeter is lost or damaged, the individual must notify the Health Physicist.

A dose evaluation report should be filled out promptly while Site personnel can still remember what they did and before the employee leaves the job or as soon as their dosimeter is lost or damaged. This will allow the Health Physicist to estimate worker's dose. The completed report is filed with the radiation exposure records.

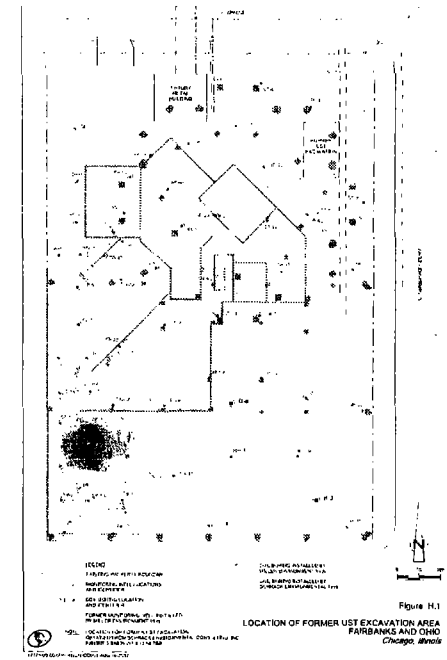
5.5.4 VISITOR DOSIMETER RECORD

Visitors, inspectors or other individuals using a self-reading dosimeter will fill out the appropriate portions of the Visitor Dosimeter Record. Initial and final dosimeter

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readings are recorded on this form as well as the dose received. These forms must be retained as the permanent record of radiation exposure for these individuals.

APPENDIX H UST EXCAVATION/RADIATION CONTOUR MAP OVERLAY



APPENDIX I
FAIRBANKS DEVELOPMENT ASSOCIATES
245 E. OHIO
SOIL REMEDIATION SCHEDULE

Description	Start	Finish	2008															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			8/25	9/1	9/8	9/15	9/22	9/29	10/6	10/13	10/20	10/27	11/3	11/10	11/17	11/24	12/1	12/8
Subsoil Testing at SW Corner of Site	25AUG08	5SEP08																
US EPA Work Plan Approval	25AUG08	29AUG08																
City of Chicago Board of Underground Meeting	27AUG08	27AUG08																
City of Chicago Work Plan Approval	27AUG08	5SEP08																
Pre Construction Site Survey Work	8SEP08	10SEP08																
Contractor Mobilization to the Site	15SEP08	15SEP08																
Surface Preparation	15SEP08	16SEP08																
Demolition Work	16SEP08	19SEP08																
SW Corner Soil Remediation Work	19SEP08	3OCT08																
Soil Remediation Work	19SEP08	15DEC08																
Site Restoration	16DEC08	19DEC08																
Contractor Demobilization	19DEC08	23DEC08																

Plain Language Checklist

Write in the active voice. When you use the active voice, the subject of the sentence acts: "EPA issued the permit to X." When you use the passive voice, the subject of the sentence is acted upon: "The permit was issued to X." If you can ask "By whom?" or "By what?" after the verb, the verb is in the passive voice. A passive verb has a form of the verb "to be" (am, is, are, was, were, be, being, been) plus a main verb usually ending in "en" or "ed."

Use action verbs. Use base verbs instead of nouns derived from verbs.

<i>Don't Say</i>	<i>Say</i>	<i>Don't Say</i>	<i>Say</i>
<i>is applicable to</i>	<i>applies to</i>	<i>make payment</i>	<i>pay</i>
<i>give consideration to</i>	<i>consider</i>	<i>take action</i>	<i>act</i>

Use personal pronouns to represent the reader and to refer to EPA. For example, "The United States Environmental Protection Agency (EPA, we) is issuing an order to X (you, your). We are offering you..."

Write short sentences to aid comprehension. Put one main thought in most sentences. Divide a long sentence into two or three short sentences. Remove all unnecessary words. If there are several conditions or subordinate provisions, make a list.

Omit surplus words and redundancies. Question the need for ~~each and~~ every word.

<i>Don't Say</i>	<i>Say</i>	<i>Redundancies</i>
<i>for the period of</i>	<i>for</i>	<i>true and correct</i>
<i>in order to</i>	<i>to</i>	<i>cease and desist</i>
<i>in the event that</i>	<i>if</i>	<i>order and direct</i>

Place words carefully to reduce ambiguity. Keep subjects and objects close to verbs. Put modifying phrases and words such as "only" and "always" next to the word they modify. She only said that he hired her." She said that only he hired her. She said that he hired only her.

Be consistent. Don't use different words to refer to the same thing (car, vehicle, automobile).

Limit your use of abbreviations and capital letters. Use abbreviations only to refer to terms that are central to the document. Do not abbreviate terms that you only use a few times. Use capital letters to begin sentences and proper names and for headings. You should reconsider all other uses.

Plain Language Checklist

Write in the active voice. When you use the active voice, the subject of the sentence acts: “EPA issued the permit to X.” When you use the passive voice, the subject of the sentence is acted upon: “The permit was issued to X.” If you can ask “By whom?” or “By what?” after the verb, the verb is in the passive voice. A passive verb has a form of the verb “to be” (am, is, are, was, were, be, being, been) plus a main verb usually ending in “en” or “ed.”

Use action verbs. Use base verbs instead of nouns derived from verbs.

Don't Say	Say	Don't Say	Say
is applicable to	applies to	make payment	pay
give consideration to	consider	take action	act

Use personal pronouns to represent the reader and to refer to EPA. For example, “The United States Environmental Protection Agency is issuing an order to X (you). We are offering you...”

Write short sentences to aid comprehension. Put one main thought in most sentences. Divide a long sentence into two or three short sentences. Remove all unnecessary words. If there are several conditions or subordinate provisions, make a list.

Omit surplus words and redundancies. Question the need for every word.

Don't Say	Say	Redundancies
for the period of	for	true and correct
in order to	to	cease and desist
in the event that	if	order and direct

Place words carefully to reduce ambiguity. Keep subjects and objects close to verbs. Put modifying phrases and words such as “only” and “always” next to the word they modify. She *only* said that he hired her. She said that *only* he hired her. She said that he hired *only* her.

Be consistent. Don't use different words to refer to the same thing (car, vehicle, automobile).

Limit your use of abbreviations, acronyms, and capital letters. Use abbreviations and acronyms to refer only to terms that are central to the document. Do not abbreviate terms that you use only a few times. Use capital letters to begin sentences, proper names, and titles and for headings. You should reconsider all other uses.

Visit the government's plain language web site at www.plainlanguage.gov.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

Yellow copy
per note

REPLY TO THE ATTENTION OF:
Lindsay Light II Site/OU 06

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Fairbanks Development Associates, LLC
c/o Michael K. Ohm, Esq.
Bryan Cave LLP
161 North Clark Street
Suite 4300
Chicago, IL 60601

Re: Lindsay Light II Site, Chicago, Illinois
OU 06, 245 E. Ohio

Dear Mr. Ohm:

Enclosed please find an executed copy of the Administrative Settlement Agreement and Order on Consent issued for this Site pursuant to Sections 106 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§9606 and 9622. Thank you for your cooperation in this matter.

If you have any questions regarding this Order, please contact Mary Fulghum, Associate Regional Counsel, at (312) 886-4683 or Verneta Simon, On-Scene Coordinator, at (312) 886-3601.

Sincerely yours,

Richard C. Karl, Director
Superfund Division

Enclosures

cc: Gary King, Superfund Program Manager
Acting Bureau Chief, Illinois Environmental Protection Agency
Bureau of Land, 1021 North Grand Avenue East, Springfield, Illinois 62702